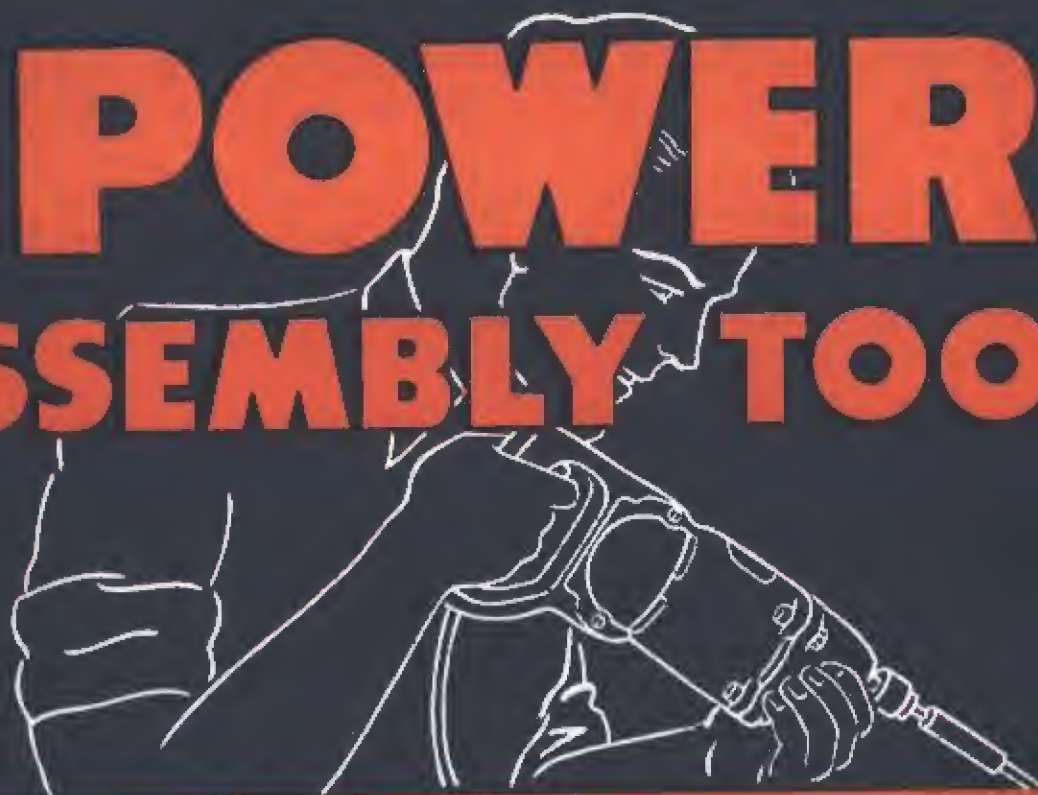


Black & Decker

DATA BOOK

POWER ASSEMBLY TOOLS



**PORTABLE ELECTRIC
SCREW DRIVERS
NUT RUNNERS
TAPPERS**

*Old home
25 Chapel St.
Almond, N.Y.*

Acknowledgements

In the preparation of the technical and tabular material used in this publication, we wish to acknowledge valuable assistance and information obtained from the American Screw Company and the Parker-Kalon Corporation on screw-thread fasteners; the Greenfield Tap and Die Corporation on taps and tapping; and other sources of screw-thread data. We also are indebted to the many users of Black & Decker Portable Power Drivers who co-operated in the making of the application photographs used herein.

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**PORTABLE ELECTRIC
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CONTENTS

INVENTION OF SCREW-THREAD.....	2
BASIC TYPES OF THREADED FASTENERS.....	3
SCREW THREAD TERMS.....	3
POWER VS. HAND—TIME-TESTS.....	4-5
INSIDE STORY.....	6-7
CONSTRUCTION FEATURES OF POWER DRIVERS.....	6-7
THE POWER DRIVE CLUTCH.....	8-10
FACTORS IN SELECTING THE RIGHT DRIVER.....	11-13
RATING THE POWER DRIVER.....	14-15
POWER DRIVERS AT WORK.....	16-18
THE POWER DRIVER LINE.....	19-38
No. 3 TORXIMETER.....	19
No. 8 SCRUGUNS.....	20-25
No. 12 DRIVERS.....	26-28
No. 22 DRIVERS.....	29-31
No. 32 DRIVERS.....	32-34
No. 42 DRIVERS.....	35-37
No. 43 DRIVER.....	38
90° ANGLE HEADS.....	39-40
SCREW DRIVER BITS.....	41-44
PILOT HOLES FOR SCREW DRIVING.....	45-47
BOLT, NUT, CAP SCREW AND LAG SCREW SIZES.....	48
SOCKET WRENCHES.....	49
TAPPERS.....	50-51
TAP TERMS AND TAP DRILL SIZES.....	52-53
ACCESSORIES.....	54-55
SUSPENSION BAILS.....	54
BENCH STANDS.....	55
STUD SETTING WITH POWER DRIVERS.....	56
USE AND CARE OF SCREWDRIVER BITS.....	57
SERVICE, NATION-WIDE.....	58



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TOWSON, MARYLAND



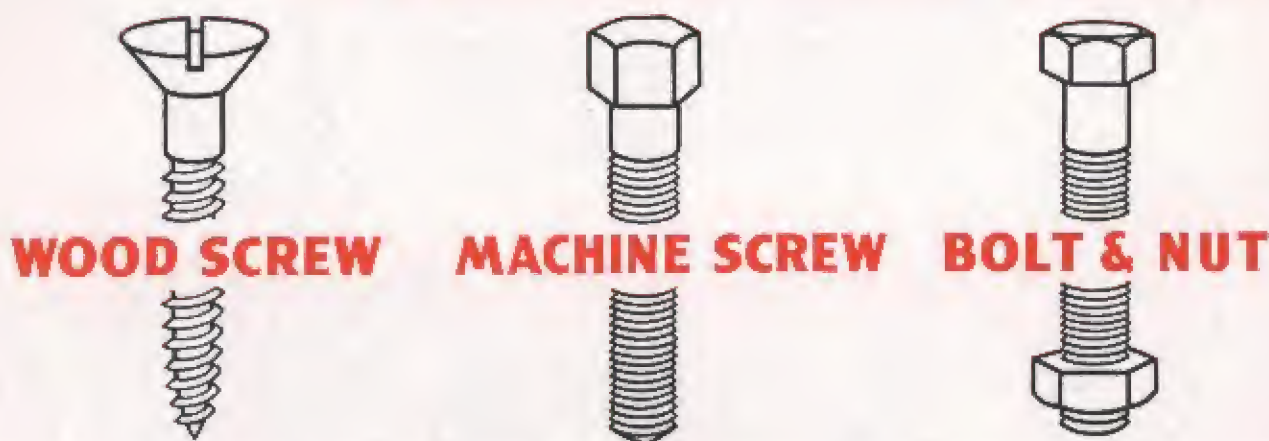
The Screw-Thread Principle

Archimedes (287-212 B.C.)—Greek mathematician and mechanic, is credited with the invention of the screw. He originally employed the principle in a machine used for raising water in irrigation. It consisted of a flexible tube, bent spirally around a solid axis. Modifications of this idea are still used in elevators.

Later the screw-thread was used for transmitting energy and was adapted to wine and oil presses, printing presses, weight lifting devices and various types of gears.

Not until the 19th century was the screw generally used as a fastening device. The first wood screws were forged and cut by hand. In 1836, screw-making machinery was introduced and today many varieties of wood screws, machine screws, metal screws, bolts and nuts are used throughout industry.

BASIC TYPES of - Threaded Fastening Devices



Riveting, welding and screw-thread fastening are the commonly used means of joining assembled products. Of these, the screw-thread is most widely used because it is most satisfactory in assembling heterogeneous materials, and the only fastener that permits ready disassembly of the product for "knock-down" shipment, inspection, repair and alteration. While many varieties of thread fasteners are used today, they all can be classified under one of the three basic types shown above.

SCREW THREAD TERMS

ANGLE OF THREAD. The angle included between the sides of the thread, measured in an axial plane.

BASE OF THREAD. The bottom section of a thread; the greatest section between two adjacent roots.

CREST. The top surface joining the two sides of a thread.

DEPTH OF THREAD. The depth, in profile, is the distance between the crest and the root of thread measured perpendicular to the axis.

HELIX ANGLE. The angle made by the helix of the thread at the pitch diameter with a plane perpendicular to the axis.

LEAD. The distance a thread advances axially in one turn. On a single thread the lead and pitch are identical; on a double thread the lead is twice the pitch, etc.

MAJOR DIAMETER. The diameter of the threaded section over the full threads measured perpendicular to the axis.

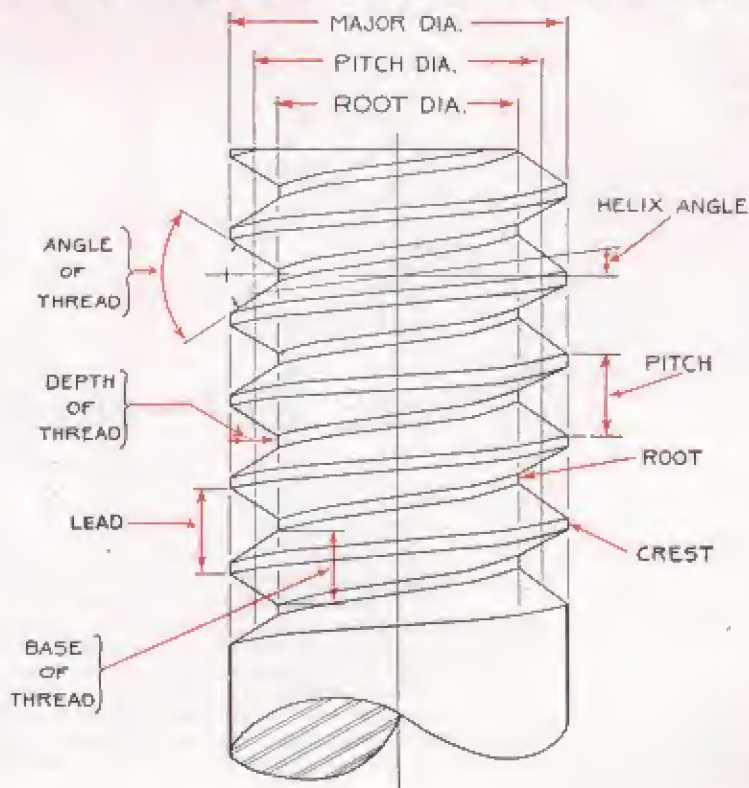
PITCH. The distance from a point on a thread to a corresponding point on the next thread measured parallel to the axis.

PITCH DIAMETER. The diameter of an imaginary cylinder which would pass through the threads at such points as to make the width of thread and the width of the spaces between the threads at these points equal.

ROOT. The bottom surface joining the

sides of two adjacent threads.

ROOT DIAMETER. The minor or root diameter of the full threaded sections of the distance between the two opposite roots measured perpendicular to the axis.



TIME TEST—Screw Driving

Material—Seasoned oak wood. Pilot Hole—No. 33 Drill.
Fastener—No. 10 flat-head wood screw, $2\frac{1}{2}$ " long.

HAND DRIVER—Square-shank heavy duty driver, 8" blade.

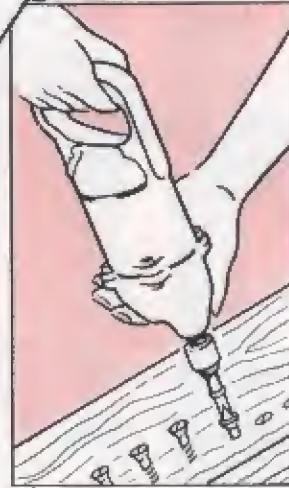
Average Speed—in $3\frac{2}{5}$ seconds—.074 inches per second.

Average Speed—Full depth ($48\frac{3}{5}$ sec.)—.037 inches per second.

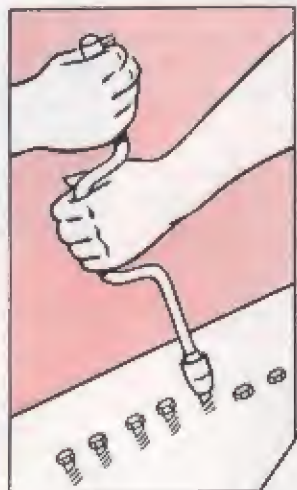
POWER DRIVER—No. 8 Positive Clutch SCRUGUN, 750 R.P.M.

Average Speed—Full depth ($3\frac{2}{5}$ sec.)—.570 inches per second.

COMPARISON—When each Driver is used for a fixed length of time, ($3\frac{2}{5}$) seconds, the Power Driver is 7.7 times faster than the Hand Driver. When each is timed on completing the drive to full depth, the Power Driver increases its lead to 15.4 times faster than the Hand Driver. This indicates the influence of constantly increasing load and the fatigue factor in hand driving.



**WHY
POWER
?**



TIME TEST—Nut Running

Material— $\frac{1}{2}$ -inch cold rolled steel, tapped $\frac{1}{2}$ "-13.
Fastener— $\frac{1}{2}$ "-13 Cap Screw, $2\frac{1}{2}$ " long.

HAND DRIVER—Hand Speed Wrench.

Average Speed—in $3\frac{1}{5}$ sec.—.351 inches per sec.

Av. Speed—Full depth (9.9 sec.)—.259 in. per sec.

POWER DRIVER—No. 22 Pos. Clutch Driver, 500 R.P.M.

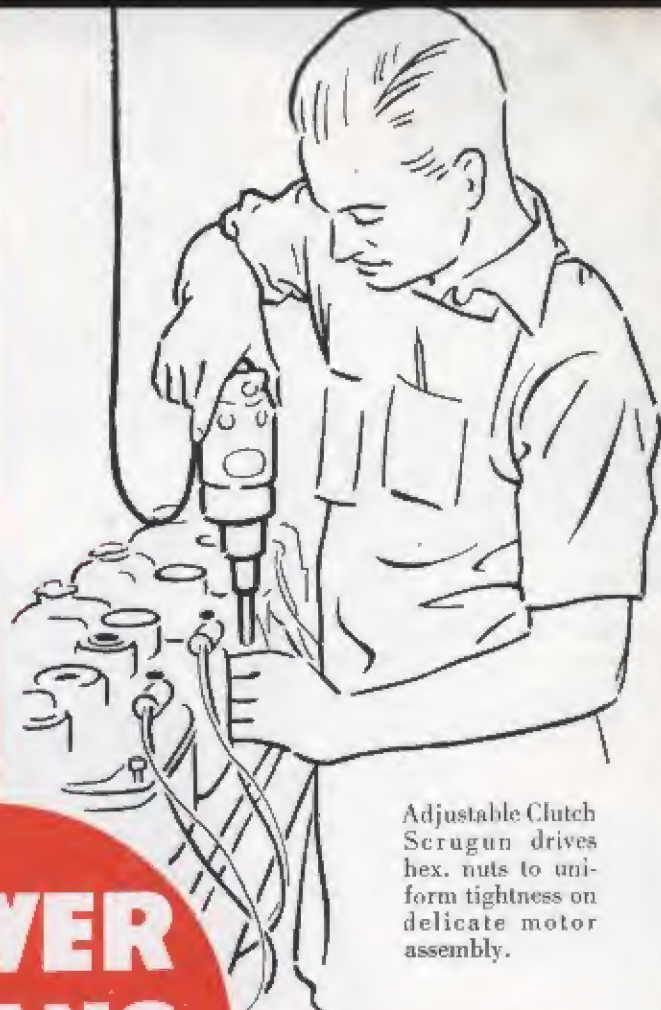
Av. Speed—Full depth ($3\frac{1}{5}$ sec.)—.800 in. per sec.

COMPARISON—When used for a fixed length of time, ($3\frac{1}{5}$ seconds), the Power Driver is 2.28 times faster than the Speed Hand Wrench. When timed on a completed drive to full tightness, the Power Driver is 3.09 times faster than the Speed Hand Wrench. On this "free running" operation, the time differential is not as great as on wood-screw driving, but the fatigue factor is still present.

The above figures are averaged from time records of a number of test drives under test conditions. You can easily duplicate these tests for your own information.



The automotive assembly line must keep moving. No. 42 Driver tightens nuts on motor assembly.



Adjustable Clutch Screwgun drives hex. nuts to uniform tightness on delicate motor assembly.

POWER MEANS SPEED



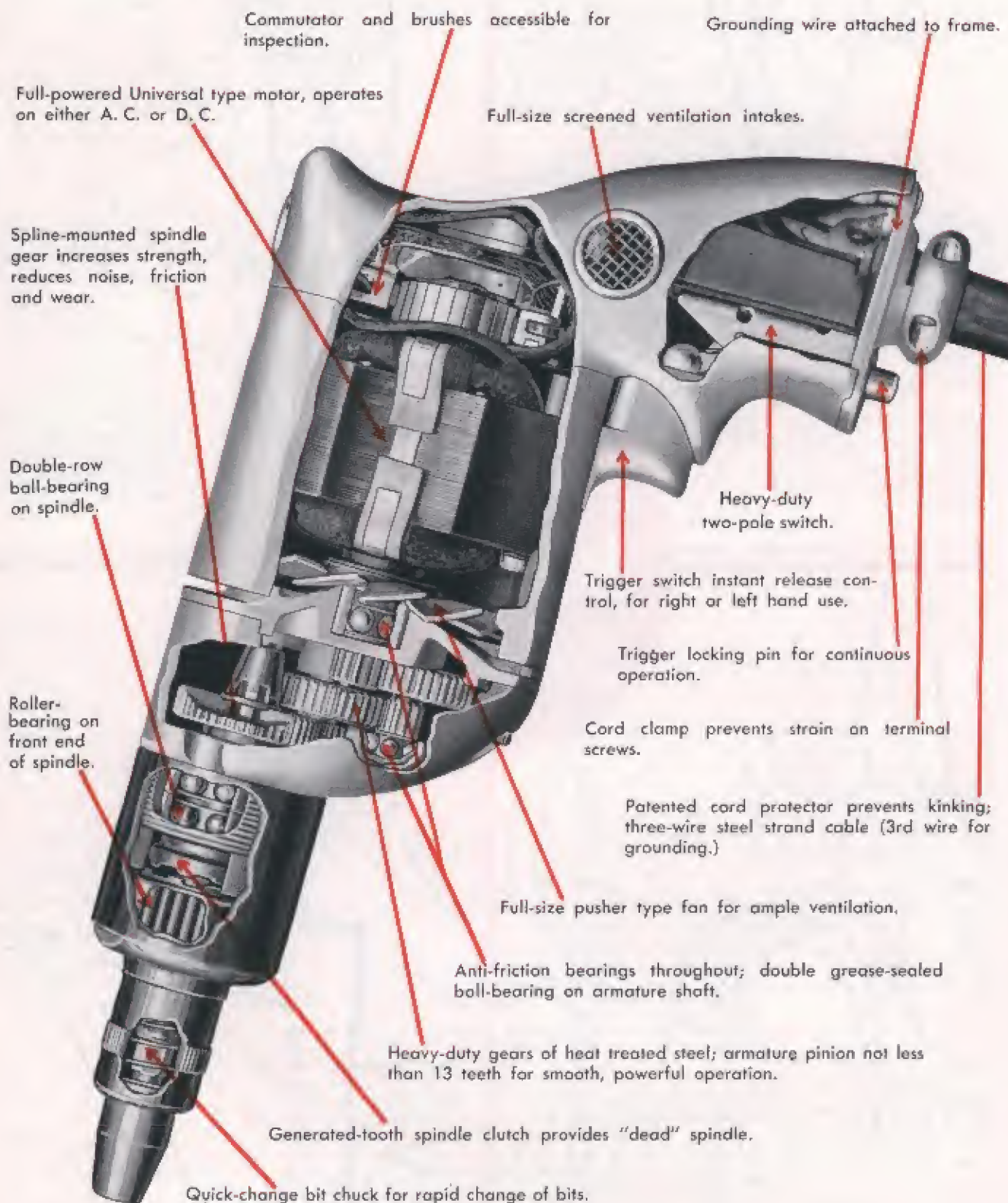
Speed in assembling electric drills: machine screws driven in end handle with No. 12 Positive Clutch Driver.



Hundreds of wood screws used in show cases: No. 22 Driver does the job fast, without scarring the surface.

The INSIDE STORY

of The No. 8 Positive Clutch SCRUGUN



While we have selected the popular SCRUGUN for our "Inside Story", most of the structural features itemized above are characteristic of the entire line of Black & Decker Power Drivers. See each Driver's specifications.

FEATURES

of the Modern Power Driver

Universal Motor

A reliable motor, with abundant power, but restricted in weight and bulk, is essential to successful Power Driver design.

Black & Decker Drivers use Black & Decker universal type motors, of tested quality materials and engineered specifically for Power Driver use.

Gearing

Quality and precision are of prime importance in building the gears that transmit and control the power of the motor. Quality for dependability and long wear; precision for less friction, quiet operation and smooth full flow of power. Various combinations of gears provide a choice of spindle speeds. Black & Decker cut their own gears for all Power Drivers.

Clutch

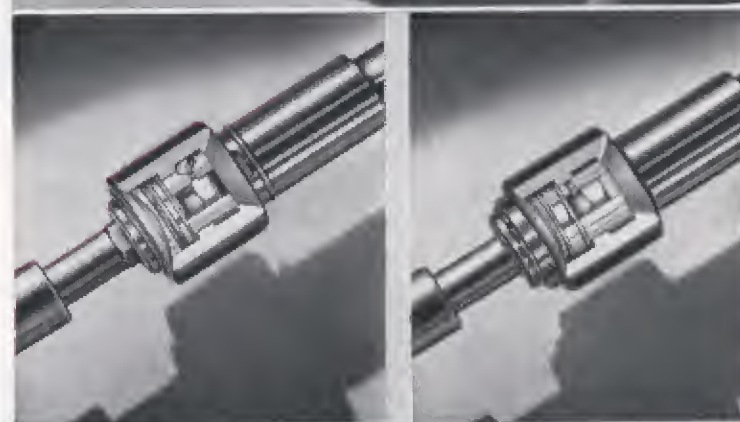
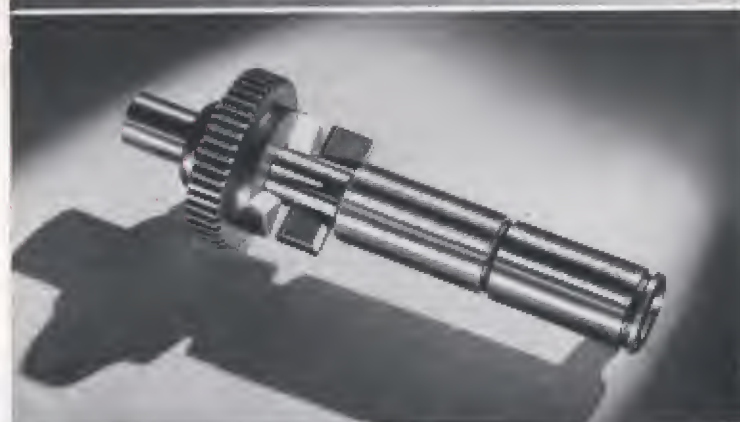
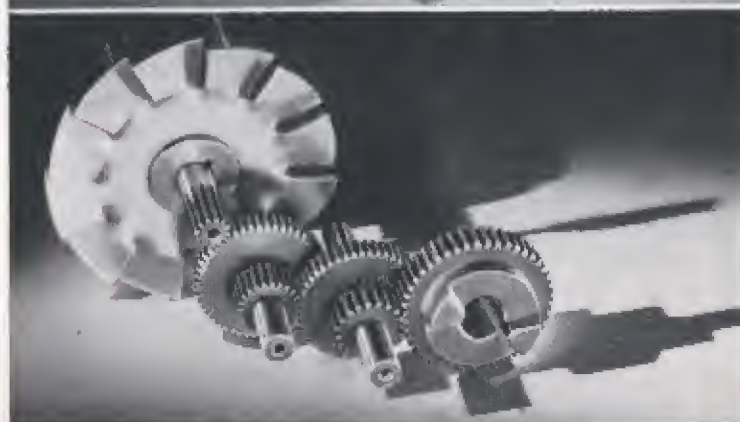
The heart of the Power Driver is the clutch, which provides a "dead" spindle for locating screw slot or nut, and which instantly disengages to prevent "overdriving" and spoiling the assembly job. Correct clutch construction and a variety of clutch arrangements are fully discussed on Pages 8 to 10.

Chuck

In many assembly operations, rapid change of bits or sockets is necessary. To accomplish this and still provide a sturdy, tight-holding chuck, we have designed and popularized the "quick-change" bit chuck, hexagonal in shape for strength, with collar and retainer ball for instant change of bits.

Switch

Dependable switches are essential to any power tool—but in Power Drivers these switches must be located for the greatest convenience of the operator. Three basic switch types are available:—The trigger switch for general use, the toggle switch for continuous use and the paddle switch for suspended tools on delicate operations. All Power Driver switches are 2-pole construction for longer, trouble-free life. Most tools can also be equipped with reversing switches for disassembling operations.



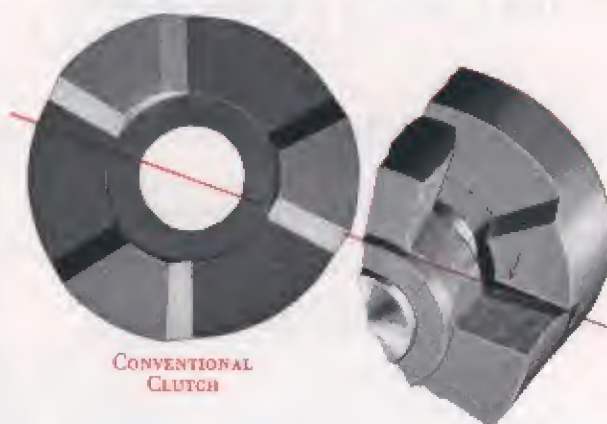
The Power Driver CLUTCH

The Generated Tooth Clutch

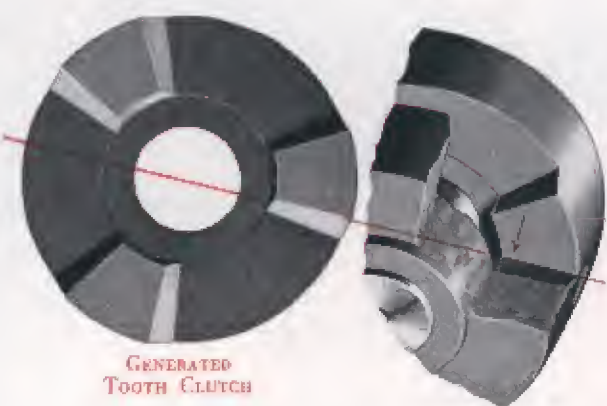
In the conventional clutch jaws, the mating surfaces are machined on a plane, at the desired angle to the rotating axis. On such a plane surface, a radial line can be drawn across the clutch face at only one position, and the mating faces are in complete surface contact only when the jaws are fully engaged. As the clutch faces move toward disengagement, this surface contact changes immediately to a *point* contact at the outer diameter of the clutch body; thus the full driving or engagement pressure is taken on this point, subjecting it to abnormal wear. This condition makes for imperfect clutch performance and short life to clutch jaws.

To improve clutch operation and to lengthen clutch-jaw life, Black & Decker has perfected and patented the "generated tooth clutch". By this process a generated surface is ground on the jaw faces, so shaped that a radial line to the axis can be drawn at any position on the faces. This generated face provides *complete surface* contact, not only when the jaws are fully engaged, but a decreasing *surface* to the point of disengagement when the surface narrows to a *line*. At no time is the full pressure concentrated on a point; clutch action is smoother and better controlled and clutch life is considerably lengthened.

All Black & Decker Power Drivers are equipped with this patented "Generated Tooth Clutch."



CONVENTIONAL CLUTCH



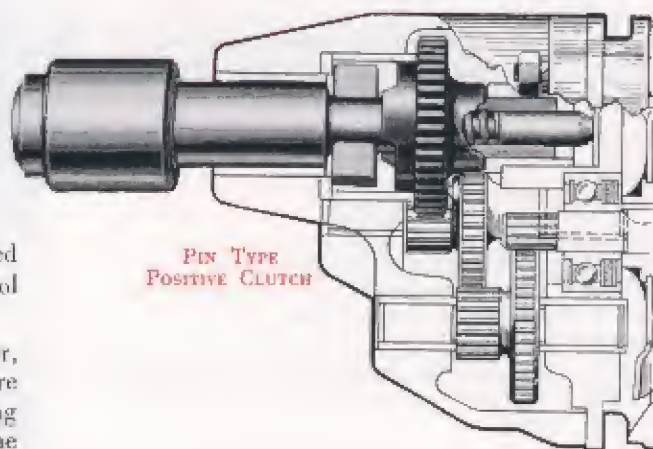
GENERATED TOOTH CLUTCH

The Positive Clutch

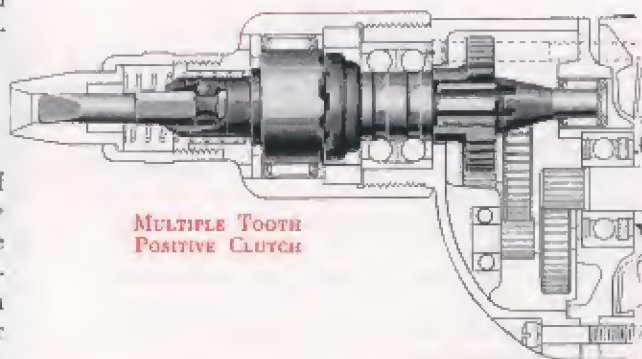
To satisfactorily engage the screwdriver bit in the screw slot or the socket on the bolt or nut, the spindle of the power tool should be stationary or "dead", while the motor is running. This is accomplished by a clutch held normally open or disengaged by a spring. After the fastener has been engaged by bit or socket, a forward pressure applied to the tool compresses the spring and engages the clutch jaws.

Sufficient forward pressure is maintained on the Driver, while driving, to keep these jaws engaged. This pressure must be greater than the resistance of the fastener being driven. A slight easing of forward pressure when the fastener has been driven home will permit the jaws to disengage. Rotation of the driving clutch member will engage the next jaw, causing a hammer blow on the mating jaw which will be transmitted to the fastener, driving it tighter. The hammer or "ratcheting" action may be continued at will until the fastener is sufficiently tight.

On the small Drivers both mating clutch jaws are of the multiple tooth type, so that a number of comparatively light blows are delivered with each ratcheting action. The larger Drivers are equipped with a driving member having two or four jaws, engaging a cross pin in the driven spindle, thereby delivering a fewer number of heavier blows.



PIN TYPE POSITIVE CLUTCH



MULTIPLE TOOTH POSITIVE CLUTCH

The Power Driver **CLUTCH** - Continued

The Adjustable Clutch

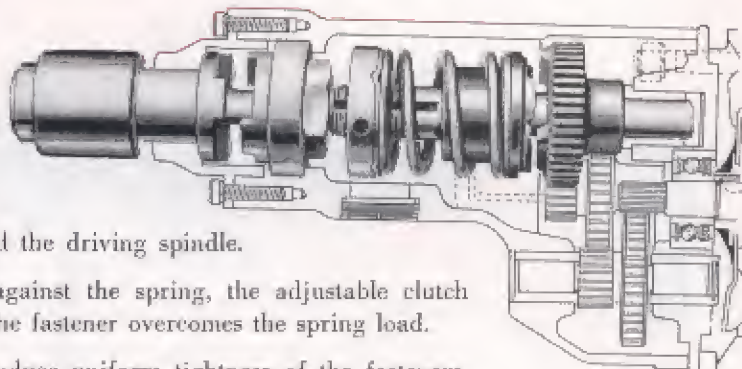
On jobs where uniform tightness of the fastener is desired, it is necessary to employ a secondary clutch in addition to the primary or dead spindle clutch which is merely used to permit a stationary spindle while engaging the fastener.

The secondary or adjustable clutch is interposed between the dead spindle clutch and the driving spindle.

With proper setting of the adjusting nut against the spring, the adjustable clutch will disengage when the driving resistance of the fastener overcomes the spring load.

Where conditions are uniform, this will produce uniform tightness of the fasteners.

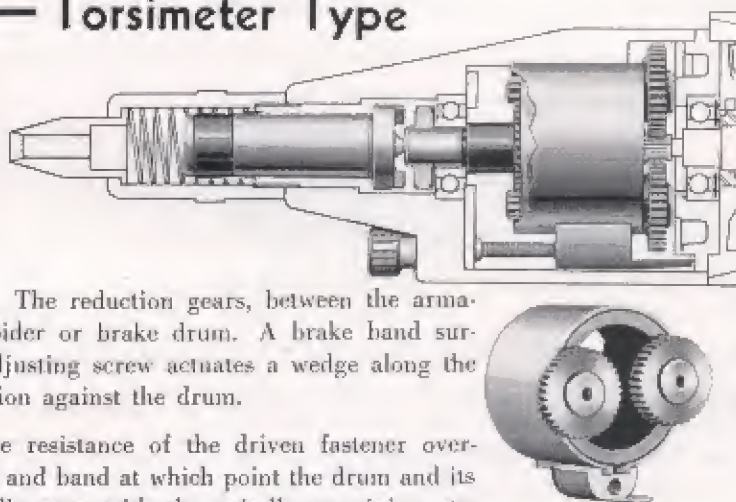
Under varying conditions such as wood screw driving where densities vary, it will be necessary to permit the adjustable clutch to ratchet several times in order to creep the fastener to the desired tightness.



The Adjustable Clutch — Torsimeter Type

Success of driving some light fasteners in delicate mechanisms depends upon the smooth action of the adjustable clutch release. The Torsimeter is equipped with the conventional dead spindle clutch which functions only while the fastener is being engaged prior to driving. It also has a secondary clutch of the friction release type. The reduction gears, between the armature and driving spindle, are mounted in a spider or brake drum. A brake band surrounds this drum in the gear housing. An adjusting screw actuates a wedge along the openings of the brake band varying the friction against the drum.

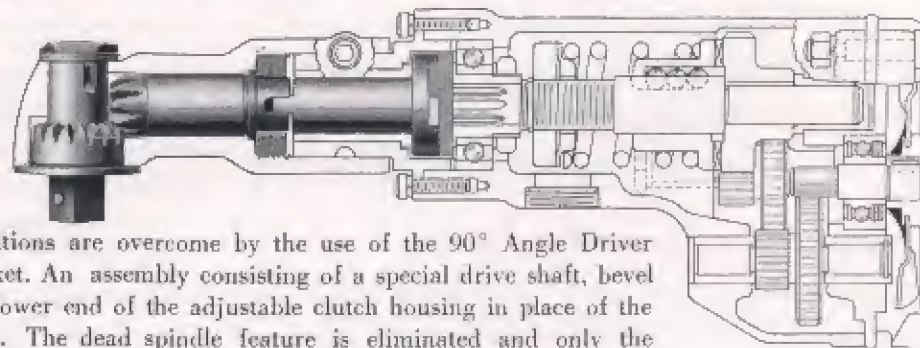
The gear train functions normally until the resistance of the driven fastener overcomes the frictional load between the drum and band at which point the drum and its gear assembly merely rotate around the spindle gear with the spindle remaining stationary.



The Adjustable Clutch — 90° Angle Type

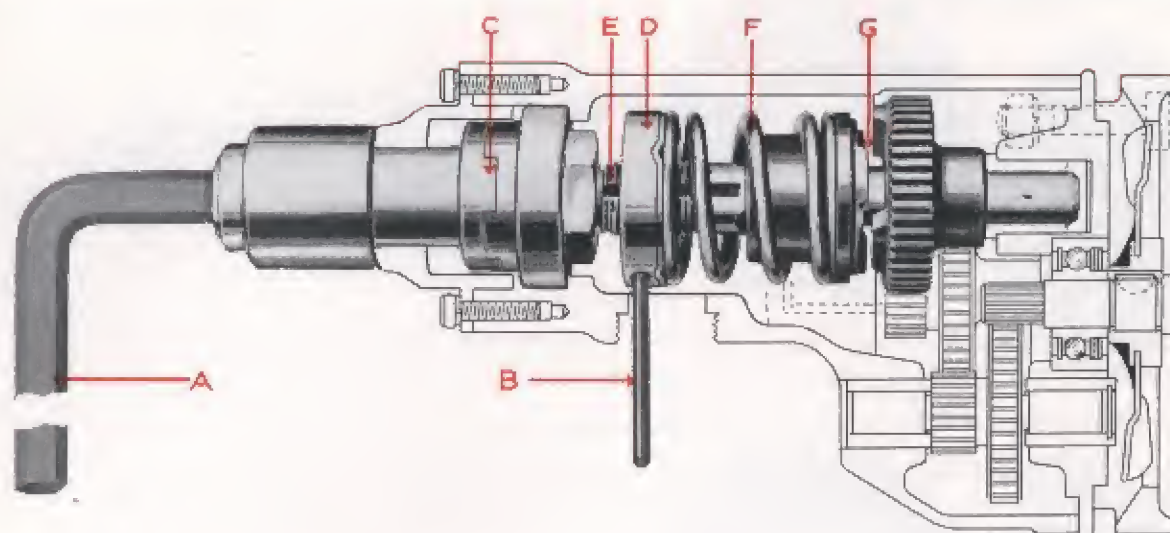
Some applications such as driving screws in furniture, automobile frames, radios, etc., have obstructions which prevent the use of a full length driver.

Almost invariably these conditions are overcome by the use of the 90° Angle Driver equipped for either bit or socket. An assembly consisting of a special drive shaft, bevel gears, etc., is attached to the lower end of the adjustable clutch housing in place of the customary end cap and chuck. The dead spindle feature is eliminated and only the secondary or adjustable clutch mechanism is used.



A reference to data on Pages 39 and 40 shows the various heads which may be obtained for the several sizes of Drivers.

How to Adjust the Clutch



Efficient use of the Adjustable Clutch Power Driver depends on the speed and simplicity of making the desired adjustments. In Black & Decker Power Drivers, the adjustments can be made in a few seconds—and changes as often as desired.

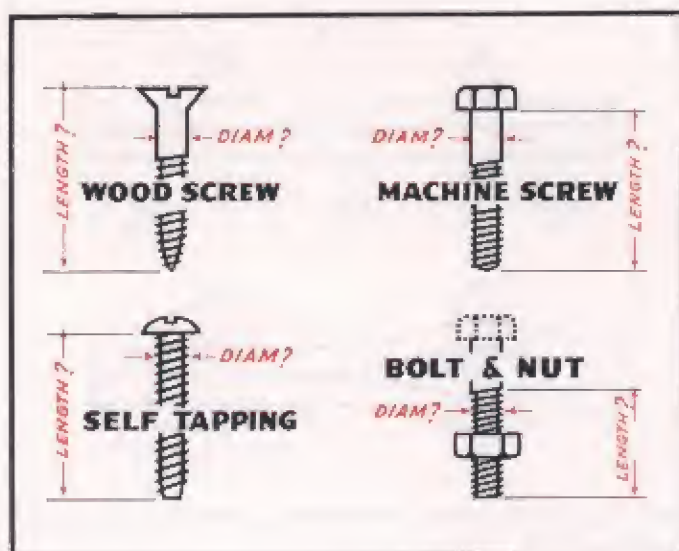
In the Torsimeter, the adjustment is made simply by turning the knurled adjusting screw, moving the wedge to tighten or loosen the brake tension on the drum. The adjusting screw is slotted so that it can be turned with a screwdriver if desired.

In the adjustable clutch illustrated at the top of the page (for Scrugun, Nos. 12, 22, 32, and 42 Drivers) the adjustment is made by increasing or decreasing the tension of spring (F). Remove the large screw cap in side of spindle housing and insert Pin (B) in any hole in the adjusting nut (D). A hexagon wrench (A) furnished with each Adjustable Clutch Driver is inserted in the chuck and pressed inward to engage the Primary Clutch (C). With the Pin holding the Adjusting Nut stationary, the Spindle is turned with the Wrench and moves the Nut backward or forward on the threaded portion (E). Turning the Wrench clockwise compresses the spring (F) putting greater tension on the secondary clutch (G), tightening the adjustment. Turning the wrench counter-clockwise allows the spring (F) to expand, reducing the tension on the secondary clutch (G), loosening the adjustment. In the Scrugun, the directions are reversed: namely, turning the wrench counter-clockwise tightens the adjustment; turning it clockwise loosens the adjustment.

Because of the many variable conditions encountered in driving screw fasteners, it is not practical to pre-determine or calibrate adjustment settings. The correct adjustment for your specific job can only be determined by trial. But because the adjustments are so simple and easily made, you can quickly set the Adjustable Clutch Driver to the exact requirements of each job—and know that the tension will remain uniform.

FACTORS in selecting the Right Power Driver

Among the 23 models of Black & Decker Power Drivers, there is a unit that can be suited to your exact requirements. But no absolute statement can be made that one Driver will drive one size of fastener under all conditions. In order to determine the correct power and speed, the type of clutch, the kind of head or type of switch, certain variable conditions of the job to be done must be considered. Some of these variables are indicated and discussed here, but all conclusions and specific ratings of tools have been determined under definite "test" conditions. All qualifying elements are clearly stated and can be compensated to adapt the Drivers to your own requirements.



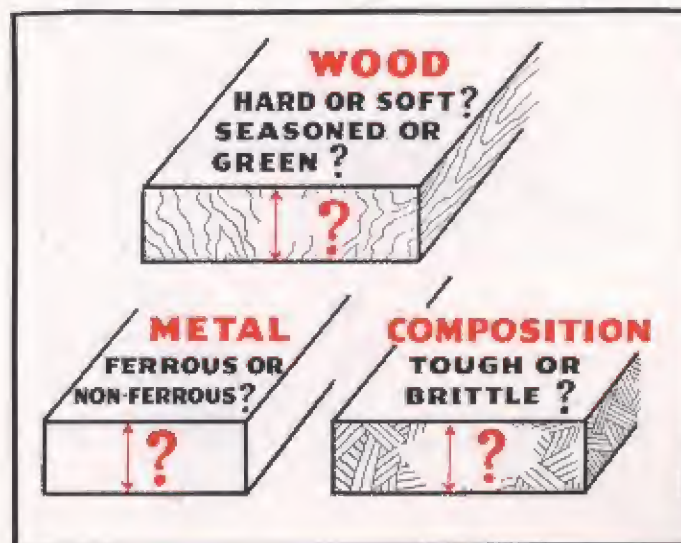
Type and Size of Fastener

Types of fasteners fall into four general classifications, but vary as to thread standard, threads-per-inch and head types.

Size of fastener must include both the major diameter and length of fastener, or distance to be driven. Friction and load are increased with length of thread. A screw with high tensile strength can be driven much tighter before failure than a softer or lower tensile strength screw. Small diameter screws have less tensile strength, and cannot be driven as tight as large diameter screws. Tensile strength also varies with kind of material and degree of hardness.

Kind of Material

The type and characteristics of material, into which fasteners are driven, must be accurately determined. This is especially true of wood, where the density of grain, the degree of seasoning and the depth of drive are important factors in determining power requirements. In general, a larger screw can be driven by the same Power Driver in soft wood than in hard wood. In metal the power should not be so great as to "over-drive" and strip the threads. Density and grain are important in synthetics, but to a less degree than in wood. Greater depth requires greater power in all cases.

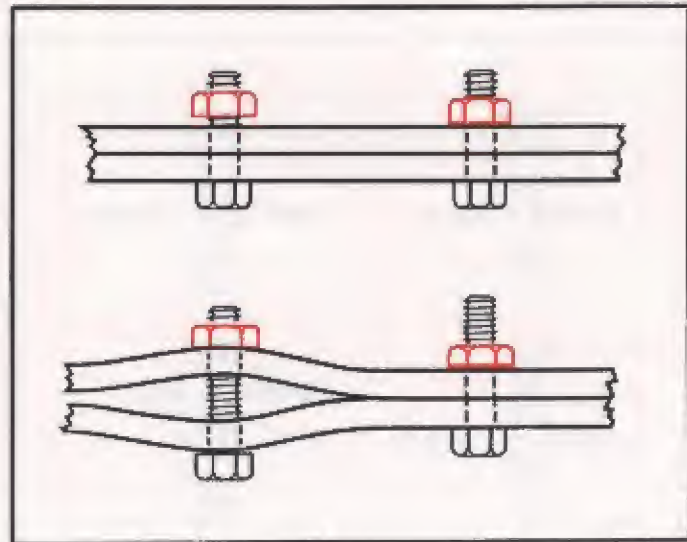


Correct Pilot Holes

It is assumed that you will not handicap operators nor risk spoilage by attempting any fastening operations without lead holes. It is equally important that correct size and depth of hole be used. Too small a hole increases power load without improving holding power of screw. Too large a hole reduces holding power. Usually two hole sizes are required — body or major diameter size in the top piece and root diameter size in the lower piece of material. A complete discussion of Pilot Holes is on Pages 46 and 47.

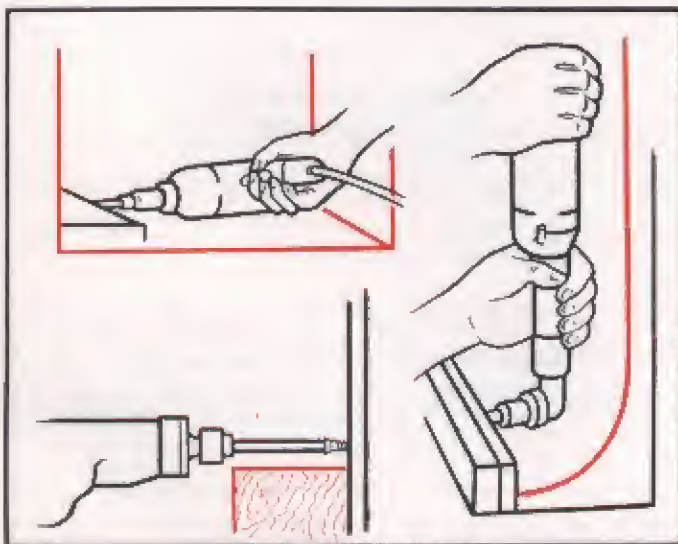
Free Running or Gathering

In pre-tapped machine screw and nut driving, little power is required for "running down" and full momentum is utilized to tighten in the final impact. If fastener is drawing pieces together, the constantly increasing load reduces momentum and requires greater power for final tightening. This also applies to wood screws, where torque increases as screw is driven in and momentum effect is nil. "Gathering" operations require more motor torque than "free-running" applications.



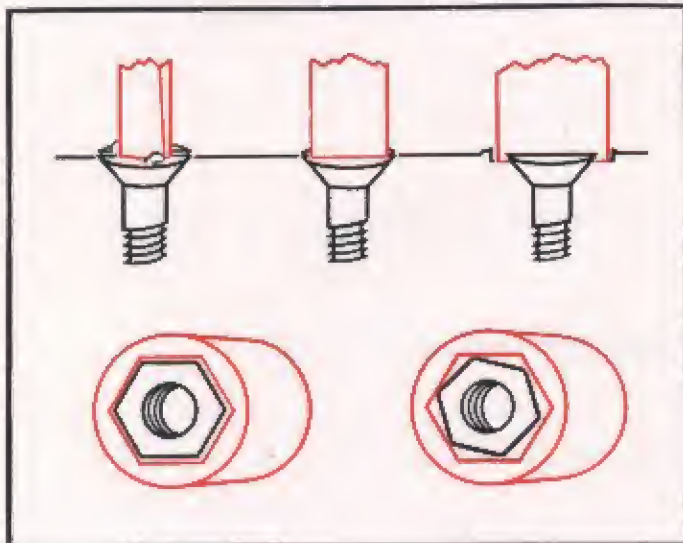
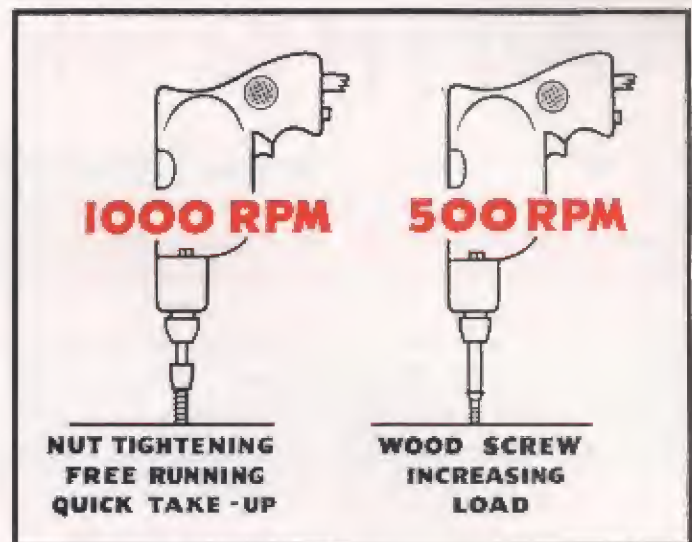
Working Clearances

Obstructions and working clearances may limit the physical size of the Power Driver, or require special adaptation of switch controls, driving heads or driving shank extensions. Our complete range of types in these three important factors will enable you to adapt a Power Driver to practically any working clearance restriction.



Correct Speed

The speed and torque of Power Drivers vary according to the gear ratio. Low gear ratio produces high spindle speed and low torque; high gear ratio produces low spindle speed and high torque. For fast production, use the highest speed Driver that will drive the fastener. Free-running applications can use high speed Drivers; but wood screw and other "tight" devices require greater torque and lower speed. Friction heat from high speed and danger of stripping threads at high torque must be considered. "Standard Speed" ratings for all Black & Decker Power Drivers are those recommended for general applications under average conditions.

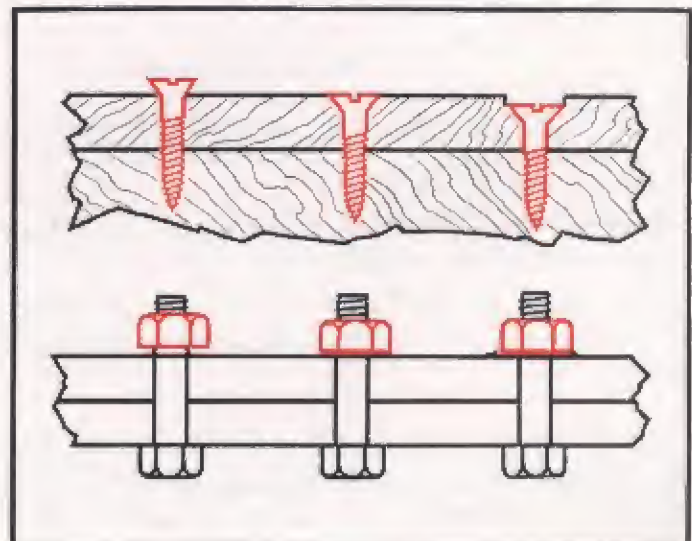


Correct Accessories

Care in selecting the driving bit or socket will pay dividends in satisfactory results. Too large a screwdriver bit will scar surrounding surface and will not fit to full depth in screw slot. Too small a bit will not hold up under torque, the shank will twist and the bit blade will gouge the screw slot. Too large a socket will tend to slip over the nut and batter the corners, making the nut unusable. Black & Decker "quick-change" chucks on all Power Drivers will help you use the correct accessory by making bit changes lightning fast. See Pages 42, 43 and 48 for tables of recommended bit and socket sizes for all fasteners.

Tightness and Uniformity

The object of a Power Driver is to drive the fastener tight — but sometimes the problem is —how tight? Sheet metal and wood screws are usually driven to the head; machine screws require a definite tightness measured in foot-pounds of torque required to loosen or further tighten. Most of the foregoing factors enter into a determination of the Power Driver required to provide a degree of tightness. For uniformity of tightness in jobs presenting a variety of conditions, consider the adjustable clutch Driver, which offers torque adjustments within given limits to compensate for load variations and accomplishes a satisfactory degree of uniformity on many operations.

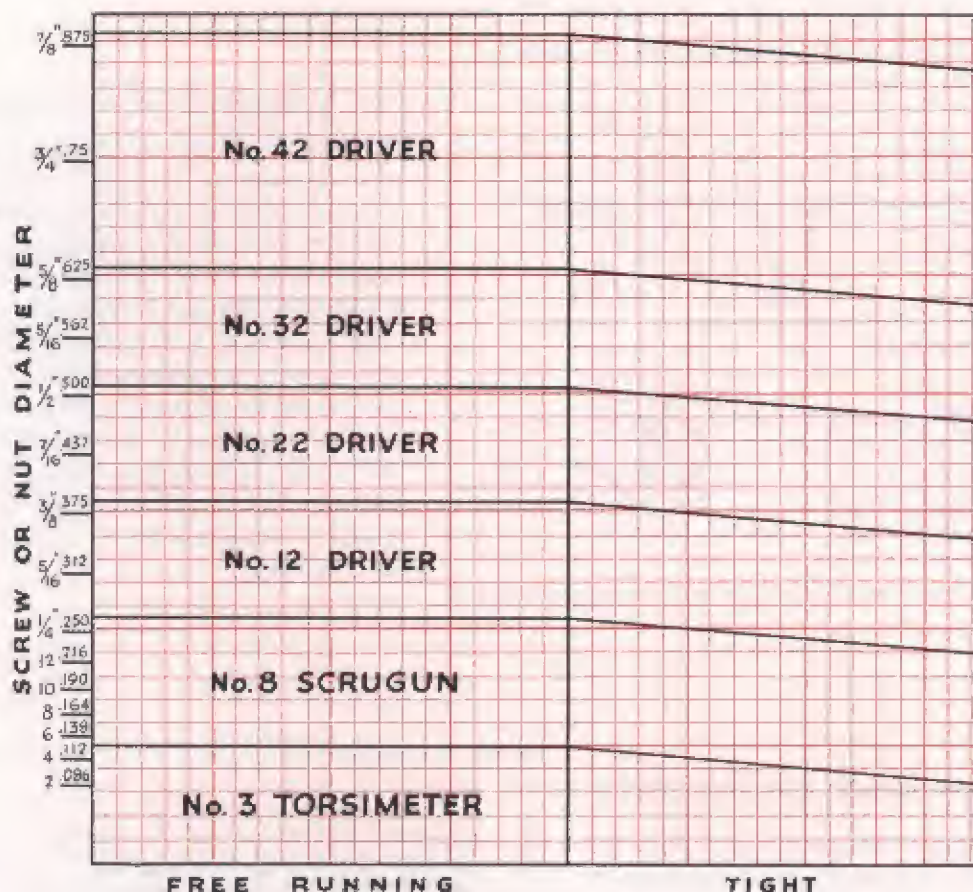


RATING the DRIVER

As indicated on the preceding pages, full efficiency from Power Assembly Tools can only be realized when the correct Driver is used for the assembly operation. Too large a Driver is wasteful, burdens the operator with excess weight, and frequently spoils the job by breaking screws or stripping threads. Too small a Driver slows down the work and does not accomplish uniform results.

The three charts below indicate the relative performance ranges of the six general groups of Power Drivers. Necessarily these charts are based on average conditions. In establishing the charts, units with standard speeds were used and adjustable units were set at maximum adjustment. Slight variations may be encountered in actual application, depending on materials, voltage variations, and other factors.

For Machine Screws and Nuts

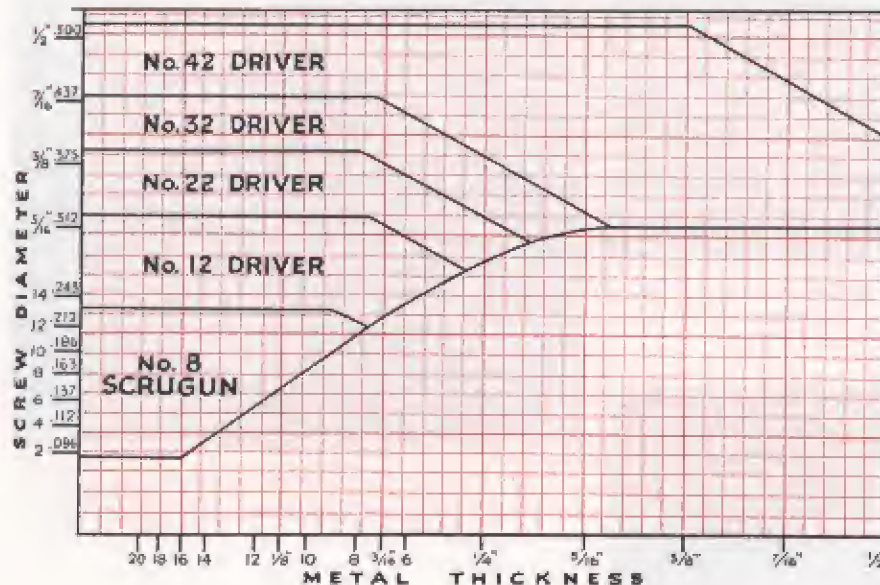


Both free-running operations and tight or gathering operations as explained on Page 12 are represented in this chart. Determine the nut or screw diameter on the vertical scale and then read the correct section of the chart for free-running or gathering operations. Because operations of this character are pre-threaded, the length of the screw or bolt has no material bearing in determining the power factor.

For extremely large or tight operations beyond the range of the No. 42 Driver, we recommend the No. 43 Power Driver equipped with very low spindle speed and high torque. This unit is only recommended for extremely heavy work of special nature.

RATING the DRIVER-continued

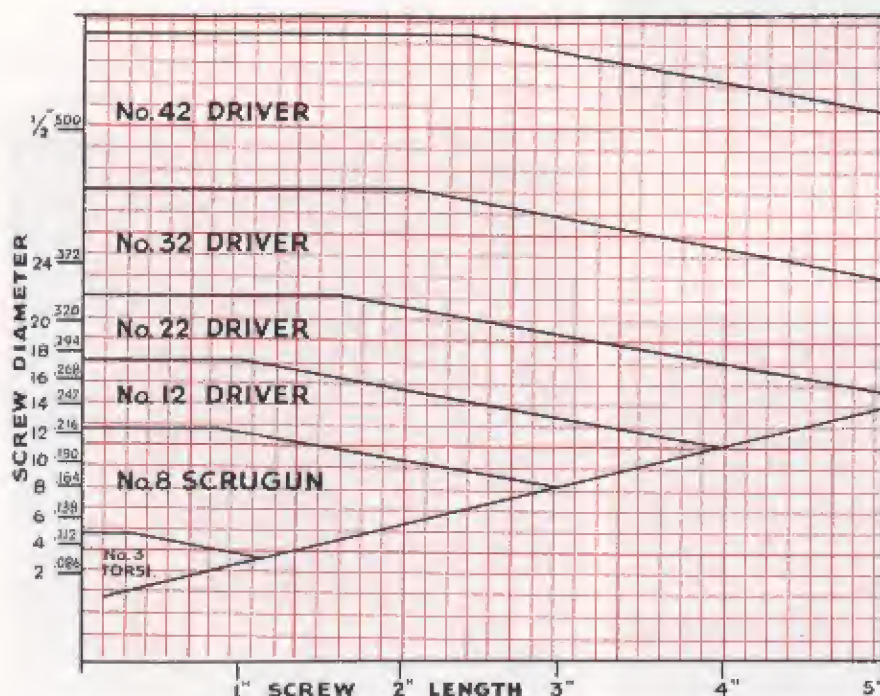
For Self-Tapping Screws



This chart indicates the Driver to be used for all types of Self-Tapping Screws used in sheet metal assemblies. The chart is based on hole size recommendations as itemized on Page 45.

First determine the screw diameter on the vertical scale; then find the metal thickness on the horizontal scale. The intersection of these two lines on the chart will indicate the proper unit for the job.

For Wood Screws and Lag Screws



This table is based on driving Standard Slotted Head Screws into seasoned oak. Compensation will have to be made therefore, for the kind of wood being used in your assembly operation.

First determine the screw diameter on the vertical scale and the length of screw in inches on the horizontal scale. The intersection of these two lines will indicate the proper Power Driver for the job. This chart is also based on the use of correct pilot and shank clearance holes, as discussed on Page 46.

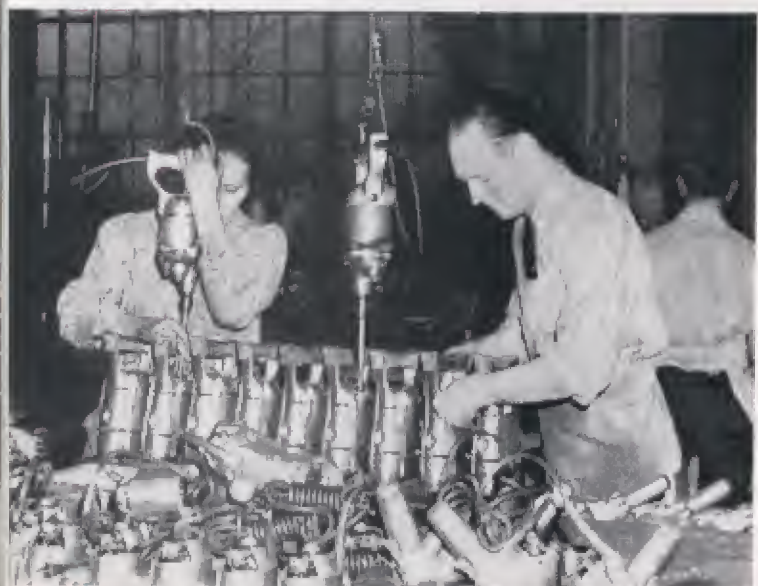
In using any of the above charts, if the size fastener or other factor carries your reading beyond the No. 42 Driver, we recommend that you investigate the possibilities of using the No. 43 Power Driver. This unit with very low speed and high torque, is designed for extra heavy duty operations.



↑ Assembling heavy wooden cash drawer. Driving wood screws with No. 22 Positive Clutch Driver.



↑ Positive Clutch Scrugun drives stator bolts to uniform tightness, assembling electric motors.



↑ Production line assembly of our own $\frac{1}{2}$ " Junior Drill No. 22 Driver fastens end handle with machine screws.

Furniture assembly. Driving Phillips Head screws with 90° Angle Drive Scrugun.



Power Drivers-

↓ High Cycle Driver tightens wheel lug nuts uniformly on automobile assembly line.

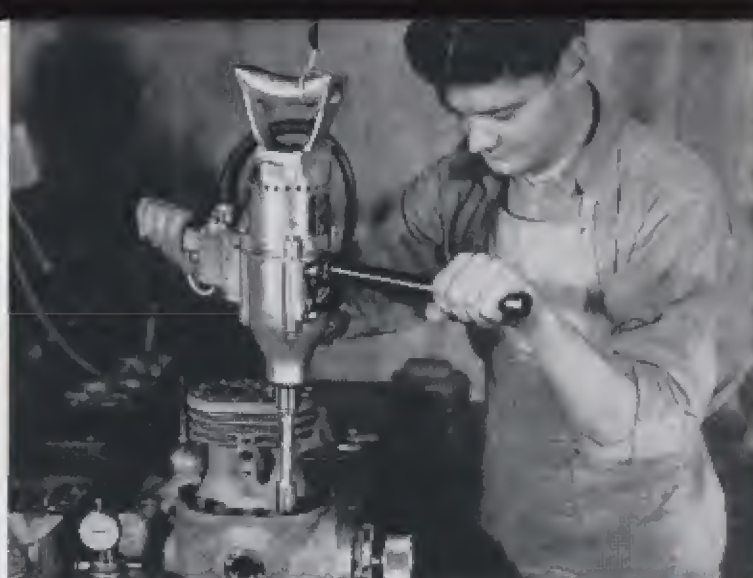




No. 22 Adjustable Clutch Driver with reversing switch, quickly loosens and tightens cylinder head nuts in engine rebuilding shop. ↑

-Speed Assembly

Close-quarter assembly. Driving metal screws in toaster housing with No. 8-90° Scrugun. ↓



Absolute tightness and uniformity are essential in compressor head assembly. High Cycle Driver does the job. ↑



No. 22 Positive Clutch Driver (with reversing switch) attaching lashing lugs to truck body. ↑

No. 12 Positive Clutch Driver tightening flange plate nuts on structural timbers. ↓





↑ High Cycle Driver assembling tire carrier on automobile assembly line.



↑ For delicate carburetor assembly, the No. 8 Adjustable Clutch Scrugun provides exactly correct driving torque.



↑ Driving hundreds of screws with No. 3 Positive Clutch Scruguns in small-boat building.

No. 22 Positive Clutch Driver is used to drive long, large wood screws in small-boat building. ↓



Do It Better and Faster-

↓ Radio cabinet assembly. No. 8-90° Center-Drive Scrugun easily handles close-corner wood screw driving.





Commercial refrigerators are built on production basis with No. 22 Positive Clutch Driver. ↑

- With Power Drivers

No. 8 Adjustable Clutch Center-Driver Scrugun provides the "watch-maker" accuracy required in assembling distributor parts. ↓



"Taking our own prescription". Inspection plates on Portable Electric Sanders are assembled with No. 3 Torsimeter. ↑



Locating flange plates on structural steel beams with No. 32 Positive Clutch Driver and socket wrench. ↑

↓ Uniform tightness in furniture assembly is assured with No. 22 Adjustable Clutch Driver.





↑ No. 12 Positive Clutch Driver tightens lock nuts on automobile clutch assembly. Tool is suspended for faster work—less fatigue.



↑ Fabrication of air conditioning ducts requires hundreds of sheet metal screws. No. 8 Positive Clutch Scrugun steps up production.

Automobile chassis assembly presents many awkward nut-running operations. A High-Cycle Driver "goes around corners" and drives them tight.



↑ A pair of Torsimeters on electric iron assembly. One equipped with socket-wrench and reversing switch; the other with screw-bit; both have paddle switches.

POWER Assembly TOOLS

↓ No. 32 Adjustable Clutch Driver suspended for tightening large nuts on motor base assembly.



No. 3 TORSIMETER

Adjustable Clutch-Center Drive

Capacity

No. 3 Torsimeter is designed for handling smallest and most delicate screw-driving operations. The maximum capacities indicated below, are based on maximum clutch adjustment, average conditions and assume the use of correct lead holes. Variations in materials and conditions may show slightly higher or lower capacities on your actual operations.

Driving Capacity—up to No. 4 size in Wood and Machine Screws.

Specifications

The structural and operating specifications of the No. 3 Torsimeter are as follows:

No-load spindle speed	1,000 R.P.M.
Net weight of complete unit	2¾ lbs.
Shipping weight	4 lbs.
Overall length (including bit)	11½"

Standard Equipment—¼" hex. "quick-change" bit chuck; one No. 13208 bit with protector sleeve, centering sleeve and spring sleeve; suspension bail; 3-conductor steel core cable and attachment plug (3rd wire for grounding); toggle switch mounted in end cap; Universal motor, operates on either A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications.....No. 49

Special Equipment

For certain types of work, especially on suspended use, a paddle-operated switch is available at slight extra cost.

Code Number for unit with paddle switch—No. 244.

A reversing switch, to reverse rotation of unit, is available at slight extra cost. The reversing switch can be used on either unit.

Features



PADDLE SWITCH

The No. 3 Adjustable Clutch Torsimeter is a highly sensitive Driver, for finest work and smallest screw sizes. The friction type adjustable clutch (see Page 9) can be set to very exact limits and operates with a very smooth action. This unit is equipped with a suspension bail, and ideally adapted to suspended use; the smooth cylindrical housing fits the operator's hand and, when equipped with the paddle-type switch, is turned on as operator grasps the tool, cutting down the number of motions on each application. The reversing switch is used for disassembling or correcting assembly errors.



SCALE 1"=1½"

No. 8 SCRUGUN

Positive Clutch

Capacity

The No. 8 Positive Clutch Scrugun is designed for light screw-driving and nut-running operations. Its maximum capacity on various types of fasteners, is based on average conditions and assumes the use of correct lead holes. Variations in materials or operating conditions will determine the exact capacity as applied to your job.

Driving Capacity—

Wood Screws—up to No. 10 by 2"

Self-tapping Screws—up to No. 12

Machine Screws & Nuts—up to $\frac{1}{4}$ " diam.

Specifications

The structural and operating specifications of the No. 8 Positive Clutch Scrugun are:

No-load spindle speed	750 R.P.M.*
Net weight of complete unit	3½ lbs.
Shipping weight.....	4¾ lbs.
Overall length (including bit)	8¾"
Spindle offset	¾"

Standard Equipment—¼" hex. "quick-change" bit chuck; one No. 13207 bit with protector sleeve, centering sleeve and spring sleeve; 3-conductor cable and attachment plug (3rd wire for grounding); 2-pole automatic-release trigger switch, with switch-locking pin; Universal motor, operates on either A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specificationsNo. 402

*SPECIAL SPEEDS—If other than the standard 750 R.P.M. speed is desired, this unit can be supplied, at no extra cost for special spindle speeds of 500, 1,000 or 1,500 R.P.M.

ACCESSORY EQUIPMENT

No. 119 Bench Stand for stationary vertical work.

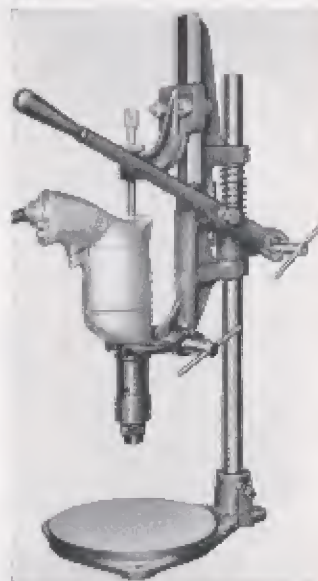
Features



SCALE $\frac{5}{16}$ "=1"

The No. 8 Positive Clutch SCRUGUN is a versatile and compact Power Driver for production service on small size screw-driving and nut-running. It is a perfect companion tool to the HOLGUN and the No. 8 TAPGUN, and its structural features are the same as these units. It has the compact, well-balanced, close-coupled construction; the trigger switch, convenient for right- or left-hand use; minimum spindle offset; full-size screened air vents; splined gear mounting and Universal motor. (See the "Inside Story" on Page 6.)

In addition to its many assembly uses as a portable Driver, the No. 8 Positive Clutch Scrugun can also be used in the No. 119 Bench Stand for stationary work, where unusual accuracy on delicate operations is required.



No. 8 SCRUGUN

Positive Clutch - Center Drive

Capacity

The Center Drive Positive Clutch Scrugun is especially suited to sheet metal screws and other small size fasteners. Its maximum rated capacity is based on average conditions and correct lead holes.

Driving Capacity—Wood Screws—up to No. 10 x 2"

Self-tapping Screws—up to No. 12

Machine Screws and Nuts—up to 1/4" diam.

Specifications

No-load spindle speed 750 R.P.M.*

Net weight of complete unit..... 4 3/4 lbs.

Shipping weight 6 lbs.

Overall length (including bit) 12"

Standard Equipment—1/4" hex. "quick-change" bit chuck; one No. 13207 bit with protector sleeve, centering sleeve and spring sleeve; suspension bail; toggle switch mounted in end cap; 3-conductor cable with attachment plug (3rd wire for grounding); Universal motor, operates on either A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications..... No. 403

Special Equipment

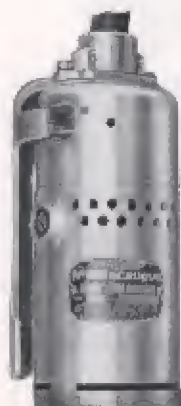
A paddle-type switch can be supplied, instead of bonnet-grip switch, at slight extra cost.

Code Number with paddle switch—No. 404.

*Special Speeds of 500, 1,000 or 1,250 R.P.M. can be furnished, instead of standard speed, at no extra cost.

A reversing switch, to change rotation of unit, is available at small cost.

Features



PADDLE SWITCH

The No. 8 Center Drive Positive Clutch Scrugun is ideal for suspended use. The center spindle improves "aim", and the paddle-switch unit cuts down number of motions; the unit is turned on as the operator grasps the tool. The reversing switch operates the tool at full power in reverse.

The end-cap switch is best suited to continuous operation. The smooth, cylindrical housing fits operator's hand and the weight and size will help reduce operator fatigue.



SCALE 3/8"=1"

No. 8 SCRUGUN

Adjustable Clutch



SCALE $\frac{1}{2}$ "=1"

Capacity

The No. 8 Adjustable Clutch Scrugun is designed for varying load demands in driving light weight sheet metal screws, machine screws, and small nuts. The rated capacities are figured at maximum clutch adjustment and are based on average conditions and correct lead holes.

Driving Capacity—Self-tapping Screws—up to No. 12.
Machine Screws and Nuts—up to $\frac{1}{4}$ " diam.

Specifications

No-load spindle speed	750 R.P.M.*
Net weight of complete unit	3 $\frac{3}{4}$ lbs.
Shipping weight	5 $\frac{1}{4}$ lbs.
Overall length (including bit)	10 $\frac{1}{4}$ "
Spindle offset	$\frac{3}{4}$ "

Standard Equipment— $\frac{1}{4}$ " hex. "quick-change" bit chuck; one No. 13207 bit with protector sleeve, centering sleeve and spring sleeve; 3-conductor cable and attachment plug (3rd wire for grounding); 2-pole automatic-release trigger switch, with switch-locking pin; Universal motor, operates on either A. C. or D. C.

Standard voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications No. 350

Special Equipment

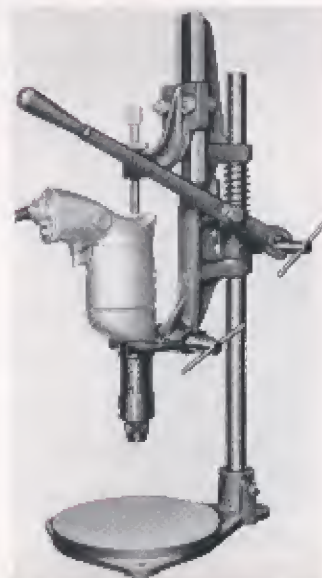
*Special Speeds of 500, 1,000 or 1,500 R. P. M. can be furnished, instead of standard speed, at no extra cost.

No. 119 Bench Stand for stationary vertical work can be used with this tool.

Features

The No. 8 Adjustable Clutch Scrugun is especially useful on self-tapping, sheet metal screws. The adjustable Clutch setting drives every screw to uniform depth and the clutch action cushions the torque of the tool, relieving the operator of any twisting motion in the Driver.

The same compact, balanced construction, trigger switch, screened air vents and splined gear mountings are structural features of this unit. It "teams up" well with the Holgun and Tapgun and can be used in the No. 119 Bench Stand where unusual accuracy on delicate operations is required.



No. 8 SCRUGUN

Adjustable Clutch-Center Drive

Capacity

The Adjustable Clutch Center Drive Scrugun is particularly designed for suspended operation. Its rated capacity is figured at maximum clutch adjustment, and is based on average conditions and correct lead holes.

Driving Capacity—Self-tapping Screws—up to No. 12.

Machine Screws and Nuts—up to $\frac{1}{4}$ " diam.

Specifications

No-load spindle speed	750 R.P.M.*
Net weight of complete unit	5 lbs.
Shipping weight	6 $\frac{1}{4}$ lbs.
Overall length (including bit)	13 $\frac{1}{2}$ "

Standard Equipment— $\frac{1}{4}$ " hex. "quick-change" bit chuck; one No. 13207 bit with protector sleeve, centering sleeve and spring sleeve; suspension bail; toggle switch mounted in end cap; 3-conductor steel-core cable with attachment plug (3rd wire for grounding); Universal motor, operates on either A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications.....No. 380

Special Equipment

A paddle-type switch can be supplied, instead of bonnet-grip switch, at slight extra cost.

Code Number with paddle switch.....No. 381

*Special Speeds of 500, 1,000 or 1,250 R.P.M. can be furnished, instead of standard speed, at no extra cost.

A reversing switch, to change rotation of unit, is available at small cost.

Features

The Adjustable Clutch Center Drive Scrugun is most popular on light metal assembly and sub-assemblies of instruments, electrical connections, sheet metal parts and similar operations. It is most frequently used on line assembly in suspended position and the paddle switch feature is frequently employed. This feature automatically turns on the unit as the operator grasps the tool, reducing motions and speeding up production time. The reversing switch operates the tool at full power in reverse and is especially useful on test assemblies.



PADDLE SWITCH



13 $\frac{1}{2}$ "

SCALE $\frac{5}{8}$ "=1"

No. 8 SCRUGUN

Adjustable Clutch - 90° Angle Drive

Capacity

The Angle Head transmits full power to the spindle. The rated capacity is based on maximum clutch adjustment, average conditions and correct lead holes.

Driving Capacity—

Self-tapping Screws—up to No. 12.

Machine Screws and Nuts—up to 1/4" diam.

Specifications

No-load spindle speed 500 R.P.M.*

Net weight of complete unit 4 1/2 lbs.

Shipping weight 6 lbs.

Overall length (including head) 10 3/4"

Standard Equipment—Special geared end with Adjustable Clutch and one of the 100-Series 90° Angle Heads; 2-pole automatic release trigger switch with switch locking pin; 3-conductor cable with attachment plug (3rd wire for grounding); Universal motor operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications with any one of the 100-Series Heads as itemized on Page 39 No. 374 (Specify head desired.)

Special Equipment

*Special speeds are available instead of standard speed at no extra cost. Available speeds are 350, 750 or 1,000 R.P.M.

Features

The No. 8 Adjustable Clutch 90° Angle Scrugun is designed for "awkward" or confined operations where the full length of the standard unit cannot be used. Especially adapted to cabinet and appliance assemblies or for horizontal use where long reach is desired. The 100-Series Heads listed on Page 39 show all dimensions and structural details and will adapt this tool to screwdriver bit or socket wrench use. The Scrugun features of compactness, balance, trigger switch, screened air vents and splined gears are present in this tool.



SCALE 5/8"=1"

No. 8 SCRUGUN

Adjustable Clutch -90° Center Drive

Capacity

The angle head transmits full power to the driving spindle. The rated capacity is based on maximum clutch adjustment, average conditions and correct lead holes.

Driving capacity—Machine Screws and Nuts—up to 1/4" diam.

Self-tapping screws—up to No. 12.

Specifications

No-load spindle speed.....	500 R.P.M.*
Net weight of complete unit.....	5 1/4 lbs.
Shipping weight.....	7 lbs.
Overall length (including head).....	14 1/8"

Standard Equipment—Special geared end with Adjustable Clutch and one of the 100-Series 90° Angle Heads; suspension bail; 2-pole toggle switch in bonnet end-cap; 3-conductor steel-core cable with attachment plug (3rd wire for grounding); Universal motor operates on A. C. or D. C.

Standard Voltage—110; also available for 200 or 250 volts.

Code Number for standard specifications with any one of the 100-Series heads as itemized on Page 39..... No. 390
(Specify head desired.)

Special Equipment

*Special Speeds of 350, 750 or 1,000 R.P.M. are available instead of standard speed at no extra cost.

A paddle-type switch can be supplied in place of bonnet grip switch at slight extra cost.

Code Number with Paddle Switch..... No. 391

A reversing switch to change rotation of unit is available at small cost.

Features



PADDLE SWITCH

The 90° Angle Center Drive Scrugun has the same adjustable clutch features as previously described. Adjustment can be set for any desired driving torque and will give uniform tightness on assembly work. This unit is particularly adapted to nut-running and sheet metal screw driving on small assembly, such as radio cabinets, small electric appliances and "awkward" screw location in furniture and other similar products. The paddle switch speeds operation as it turns on when operator grasps the tool. The No. 100-Series Angle Heads are completely listed and described on Page 39 and adapt this tool to a number of screwdriving and nut-running operations.



14 1/8"

SCALE 3/8"=1"

No. 12 POWER DRIVER

Positive Clutch



SCALE 1"=2 1/4"

Capacity

The No. 12 Positive Clutch Driver is designed for wood-screw, machine screw and nut driving in medium sizes. Its rated capacity is based on average conditions and assumes the use of correct lead holes.

Driving Capacity—Wood Screws—up to No. 14 x 2 1/2".

Self-tapping Screws—up to 5/16" diam.

Lag Screws—up to 1/4" x 2".

Machine Screws & Nuts—up to 3/8" diam.

Specifications

No-load spindle speed	500 R.P.M.*
Net weight of complete unit	6 3/4 lbs.
Shipping weight	9 lbs.
Overall length (including chuck)	13 1/4"

Standard Equipment—7/16" hex. "quick-change" bit chuck; one each No. 5330 and No. 5344 bit, with finder; 2-pole automatic release trigger switch, with switch-locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal Motor operates on A. C. or D. C.

Standard Voltage—110; also available for 32, 220 or 250 volts.

Code Number for standard specifications.....No. 53

Special Equipment

*Special Speeds of 750, 1,000 or 1,600 R.P.M. are available, instead of standard speed, at slight extra cost.

No. 119 Bench Stand adapts this Driver to stationary horizontal use.

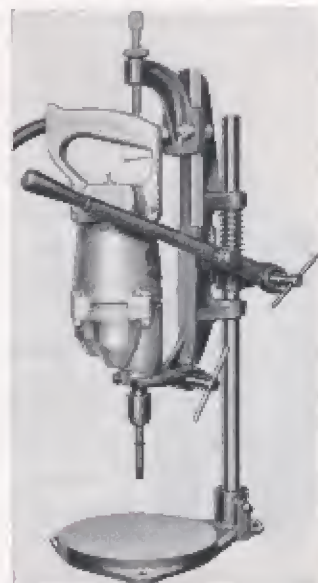
Reversing Switch, at extra cost, adapts tool to disassembling applications.

Features

The No. 12 Positive Clutch Driver is equipped with the pin-type clutch (see Page 8) adapting it to heavy-duty service and a variety of driving operations. It is especially recommended for wood-screw work and for nut-tightening where the "ratcheting" clutch action is desired for extra tightness.

The reversing switch makes this unit ideal for opening crates and cases and disassembling work.

The comfortable end switch handle and easy trigger control; the removable commutator inspection plates; the through-bolt housing assembly; the full size pusher-type fan and ample vent slots—all add to the sturdy service and life of this unit.



No. 12 POWER DRIVER

Adjustable Clutch

Capacity

The No. 12 Adjustable Clutch Driver is designed for varying load demands in driving medium size wood-screws, machine-screws and nuts. Its rated capacity is based on maximum clutch adjustment, average driving conditions and correct size lead holes.

Driving Capacity—Self-tapping screws—up to 5/16" diam.

Machine Screws and Nuts—up to 3/8" diam.

Specifications

No-load spindle speed.....500 R.P.M.*

Net weight of complete unit.....8 lbs.

Shipping weight.....12 lbs.

Overall length (including chuck).....15 1/2"

Standard Equipment—7/16" hex. "quick-change" bit chuck; one each No. 5330 and No. 5344 bit, with finder; 2-pole automatic release trigger switch, with switch-locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor operates on A. C. or D. C.

Standard Voltage—110; also available for 32, 220 or 250 volts.

Code Number for standard specifications.....No. 169

Special Equipment

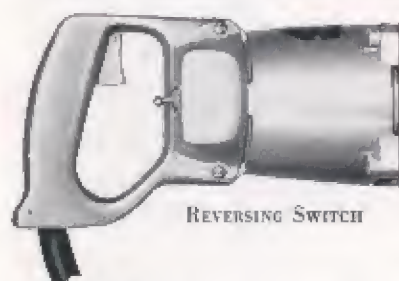
*Special Speeds of 750, 1,000 or 1,600 R. P. M. are available, instead of standard speed, at slight extra cost.

No. 119 Bench Stand adapts this Driver to stationary horizontal use.

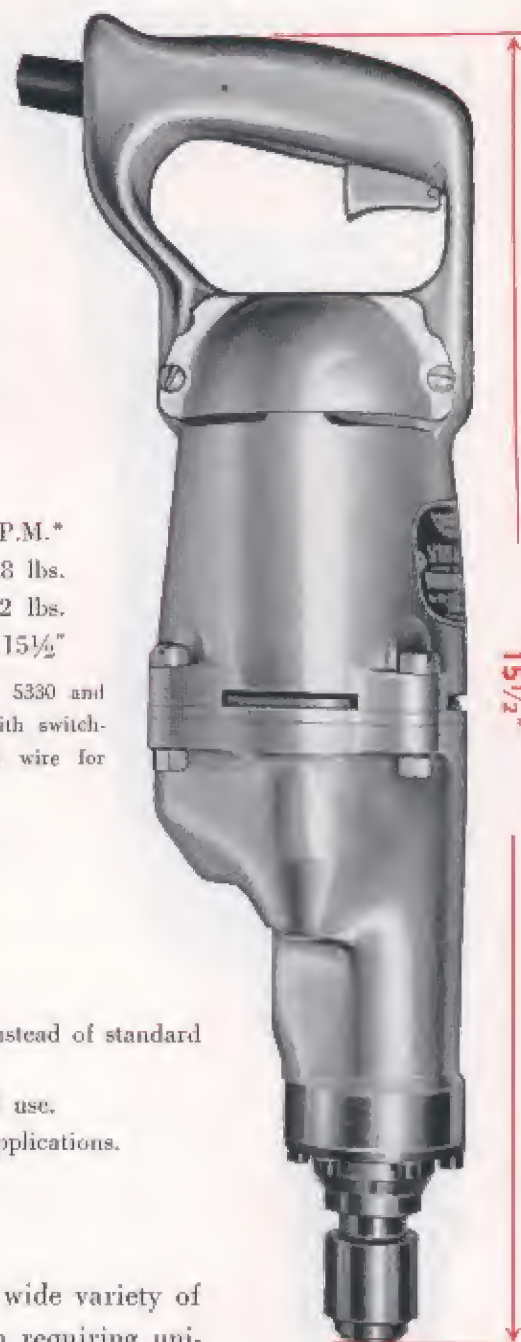
Reversing Switch, at extra cost, adapts tool to disassembling applications.

Features

The No. 12 Adjustable Clutch Driver can be used on a wide variety of fastening operations, each requiring uniformity and precision. The adjustable clutch (see Page 9) is easily set for required tension and its sturdy construction will stand up under hard usage. With reversing switch, it is especially adapted to taking down and reassembling machine



REVERSING SWITCH



SCALE 1"=2 1/4"

No. 12 POWER DRIVER

Adjustable Clutch -90° Angle Drive

Capacity

The No. 12 Adjustable 90° Angle Driver is designed for "hard-to-reach" sheet metal and machine screw driving and nut running, in medium sizes. The angle head transmits full power to the spindle; the rated capacity is based on maximum clutch adjustment, average conditions and correct lead holes.

Driving Capacity—Self-tapping screws—up to 5/16" diam.
Machine Screws and Nuts—up to 3/8" diam.

Specifications

No-load spindle speed	500 R.P.M.*
Net weight of complete unit	9½ lbs.
Shipping weight	15 lbs.
Overall length (including head)	18¼"

Standard Equipment—Special geared end and one of the 200-series or 300-series 90° heads; 2-pole automatic release trigger switch with switch-locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Numbers with various 90° Heads available for use with this Driver.

Head Number	Code No. (complete unit)	Head Number	Code No. (complete unit)
200	171-200	300	172-300
201	171-201	301	172-301
202	171-202	302	172-302
204	171-204	305	172-305
205	171-205	307	172-307
250	171-250		

See Pages 39 and 40 for complete Head Specifications

Special Equipment

*Special Speeds of 350, or 700 R.P.M. are available, instead of standard speed, at slight extra cost.

Reversing Switch, to reverse rotation of unit, can be attached at small cost.

Features

The combination of adjustable clutch and angle drive heads, adapt this No. 12 Driver to many "hard-to-reach" assembly operations. The various heads provide a choice of screw-bit or socket wrench drives; the adjustable clutch assures uniform tightness. The trigger switch control; full-size pusher-type fan and vent slots; heavy-duty gears, bearings and clutch members—all are designed for dependable operation and long service. The reversing switch makes it possible to operate tool for driving or backing-out as desired.



SCALE 1"=2¼"

No. 22 POWER DRIVER

Positive Clutch

Capacity

The No. 22 Positive Clutch Driver is designed for driving larger size wood screws and sheet metal screws, and for medium range nut-running. Its rated capacity is based on average conditions and correct lead holes.

Driving Capacity—

Wood Screws—up to No. 18 x $3\frac{1}{2}$ ".
Self-tapping Screws—up to $\frac{3}{8}$ " diam.
Lag Screws—up to $5/16$ " x 3".
Machine Screws and Nuts—up to $\frac{1}{2}$ " diam.

Specifications

No-load spindle speed	500 R.P.M.*
Net weight of complete unit	9 lbs.
Shipping weight	11 $\frac{3}{4}$ lbs.
Overall length (including chuck)	14 $\frac{1}{4}$ "

Standard Equipment— $7/16$ " hex, "quick-change" bit chuck; one each No. 5343 and No. 5329 bits with finders; 2-pole automatic-release trigger switch with switch-locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 32, 220 or 250 volts.

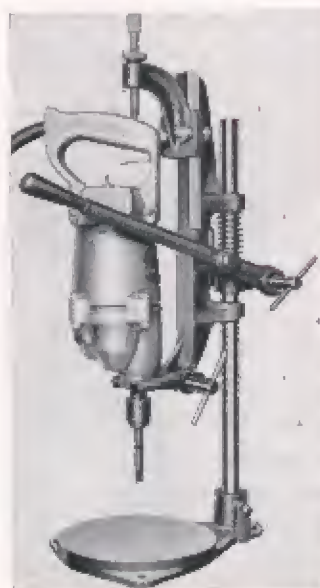
Code Number for standard specifications..... No. 54

Special Equipment

*Special Speeds of 750, 1,000 or 1,600 R.P.M. are available, instead of standard speed, at slight extra cost.

No. 119 Bench Stand, at extra cost, adapts the No. 22 Driver to stationary vertical driving operations.

Reversing Switch, which reverses rotation of the Driver when desired, can be attached to the No. 22 Driver at small cost.



Features

SCALE 1"=2 $\frac{1}{4}$ "

The pin type positive clutch of the No. 22 Driver (see Page 8) makes it specially suitable for large wood-screw driving, where the "ratcheting" clutch action can be employed for final tightening. Clutch members, gears and bearings are all built for heavy-duty service. The trigger switch is useful for right- or left-hand operation; full-size pusher fan and vent slots; commutator inspection plate; through bolt assembly of housings, smooth housing design—all make a handy, easy-to-use, long service tool. The reversing switch is useful for disassembly and inspection. The Bench Stand affords an accurate feed for precision driving.

No. 22 POWER DRIVER

Adjustable Clutch

Capacity

The No. 22 Adjustable Clutch Driver is suited to uniform nut-tightening and machine screw driving. Its rated capacity is based on maximum clutch adjustment, average conditions and correct lead holes.

Driving Capacity—Self-tapping Screws—up to $\frac{3}{8}$ " diam.

Machine Screws and Nuts—up to $\frac{1}{2}$ " diam.

Specifications

No-load spindle speed 500 R.P.M.*

Net weight of complete unit 10½ lbs.

Shipping weight 16 lbs.

Overall length (including chuck) 17¼"

Standard Equipment—7/16" hex. "quick-change" bit chuck; one each No. 5343 and No. 5329 bits with finders; 2-pole automatic-release trigger switch with switch-locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 32, 220 or 250 volts.

Code Number for standard specifications No. 164

Special Equipment

*Special Speeds of 750, 1,000 or 1,600 R. P. M. are available, instead of standard speed, at slight extra cost.

No. 119 Bench Stand, at extra cost, adapts the No. 22 Driver to stationary vertical driving operations.

Reversing Switch, which reverses rotation of the Driver when desired, can be attached to the No. 22 Driver at small cost.

Features

The adjustable clutch (see Page 9) of the No. 22 Driver, is easily set for desired tension and will drive each screw or nut to uniform tightness. This is especially useful on machinery assembly and on self-tapping screw fasteners.

With reversing switch, this Driver is popular for dis-assembling engines and machinery for inspection and repair—then re-assembling to uniform tightness. The Bench Stand adapts the Driver to jobs that require unusual feeding pressure or very accurate "aim" on precision work.



REVERSING SWITCH

SCALE 1"=2¼"

No. 22 POWER DRIVER

Adjustable Clutch - 90° Angle Drive

Capacity

The No. 22 Adjustable 90° Angle Driver is best suited to "hard-to-reach" assembly operations, where a minimum of working clearance is important. The angle head transmits full power to the spindle. Its rated capacity is based on maximum clutch adjustment, average conditions and correct lead holes.

Driving Capacity—Self-tapping screws—up to $\frac{3}{8}$ " diam.
Machine Screws and Nuts—up to $\frac{1}{2}$ " diam.

Specifications

No-load spindle speed 500 R.P.M.*
Net weight of complete unit 12 lbs.
Shipping weight 18 lbs.
Overall length (including head) 19 $\frac{5}{8}$ "

Standard Equipment—Special geared end and one of the 200-Series or 300-Series 90° heads; 2-pole automatic release trigger switch and switch locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Numbers, with various 90° angle heads available for use with this Driver.

Head Number	Code No. (complete unit)	Head Number	Code No. (complete unit)
200	166-200	300	167-300
201	166-201	301	167-301
202	166-202	302	167-302
204	166-204	305	167-305
205	166-205	307	167-307
250	166-250		

See Pages 39 and 40 for complete Head specifications.

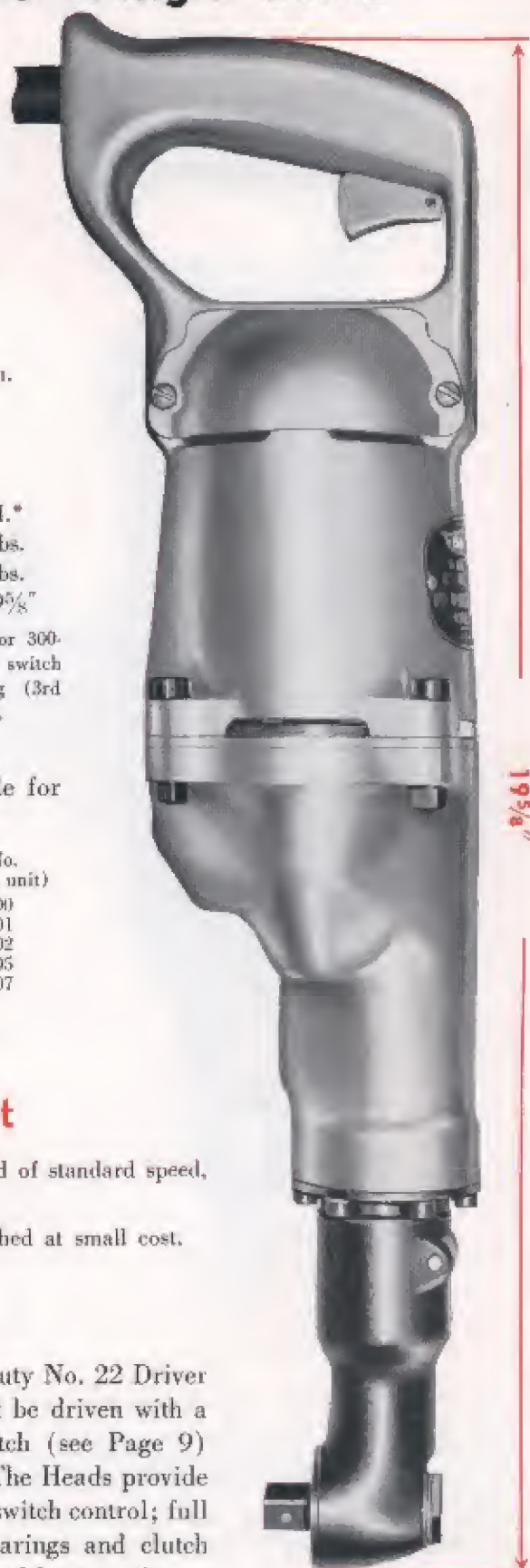
Special Equipment

*Special Speeds of 350 or 700 R.P.M. are available, instead of standard speed, at slight extra cost.

Reversing Switch, to reverse rotation of unit, can be attached at small cost.

Features

The angle heads adapt the full power of the heavy-duty No. 22 Driver to awkward assembly jobs, where large fasteners must be driven with a minimum of working clearance. The adjustable clutch (see Page 9) assures uniform driving even in inaccessible places. The Heads provide a choice of screw-bit or socket-wrench drives. Trigger switch control; full size pusher fan and vent slots; heavy-duty gears, bearings and clutch members—all are designed for dependable operation and long service.



SCALE 1"=2 $\frac{1}{4}$ "

No. 32 POWER DRIVER

Positive Clutch

Capacity

The No. 32 Positive Clutch Driver is designed for heavy-duty service on larger size machine screw and nut driving. Its rated capacity is based on average conditions and properly prepared holes.

Driving Capacity—

Machine Screws and Nuts—up to $\frac{5}{8}$ " diam.

Lag Screws—up to $\frac{3}{8}$ " x $4\frac{1}{2}$ ".

Specifications

No-load spindle speed..... 500 R.P.M.*

Net weight of complete unit..... $22\frac{1}{2}$ lbs.

Shipping weight..... $28\frac{1}{2}$ lbs.

Overall length (including chuck)..... $19\frac{1}{2}$ "

Standard Equipment— $\frac{5}{8}$ " hex. "quick-change" bit chuck; one $\frac{5}{8}$ " hex. socket wrench; 2-pole automatic release trigger switch with switch locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); detachable spade handle and side pipe handle; Universal motor, operates on A. C. or D. C.

Standard Voltage — 110; also available for 220 or 250 volts.

Code Number for standard specifications.....No. 55

Special Equipment

The No. 32 Driver can be furnished with end switch handle at no extra cost, instead of side switch handle; no spade handle or side pipe handle furnished with end-handle unit.

Net weight End-handle unit..... $21\frac{1}{4}$ lbs.

Shipping Weight..... $27\frac{1}{2}$ lbs.

Overall length (including chuck)..... 20"

Code Number for End-handle Unit.....No. 392

*Special Speeds of 350, 700 or 900 R.P.M. can be furnished, instead of standard speed, at slight extra cost.

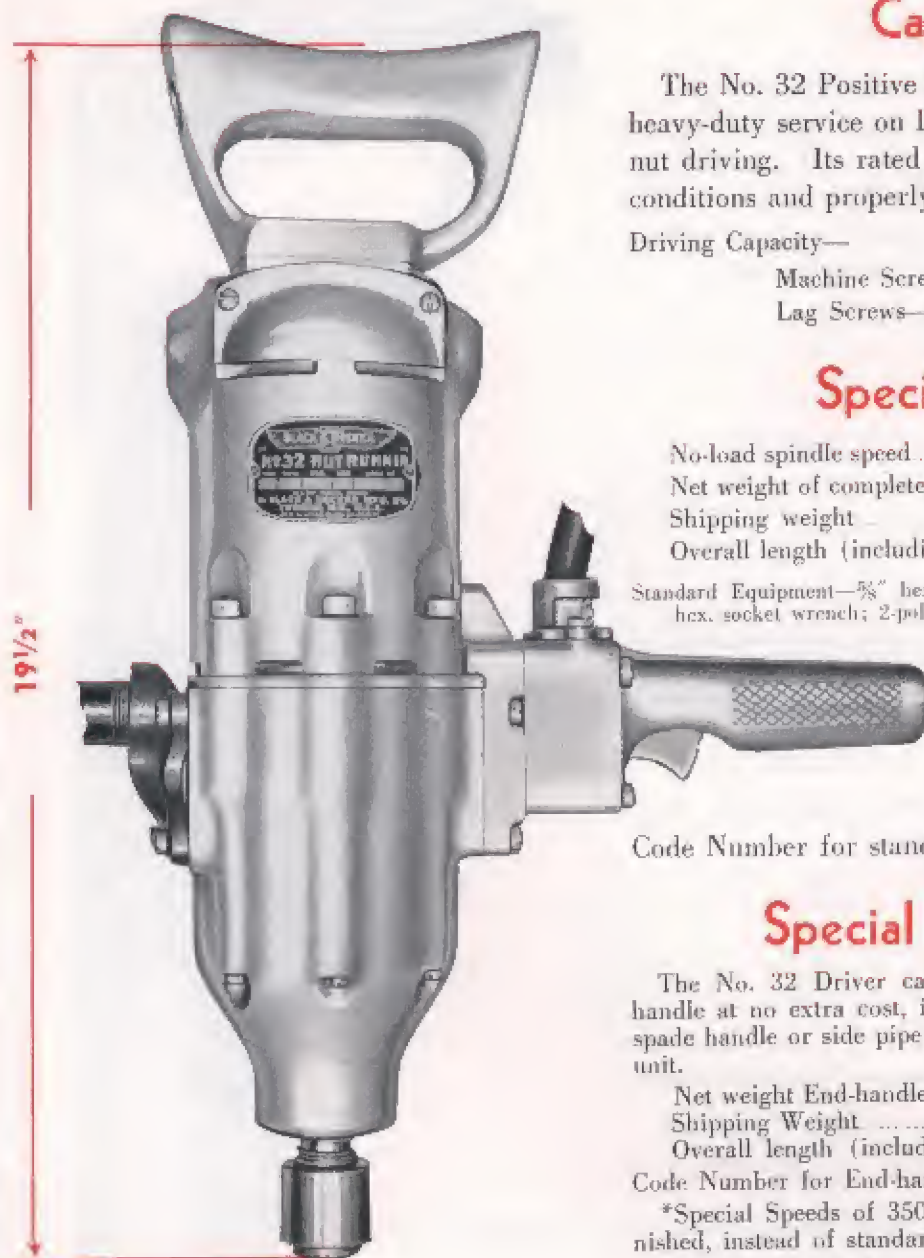
Reversing Switch for operating Driver in reverse rotation, can be attached at small cost.

Suspension Equipment, see Page 54.

Features

The No. 32 Positive Clutch Driver is sturdily built throughout for heavy-duty service. Long machine screws give housings added rigidity; gears, bearings and pin type clutch (see Page 8) are of heavy-duty size; switch handle and side pipe handle are long to control torque.

The end-handle unit is usually suspended so operator will be relieved of weight and torque. (See Suspensions, Page 54) The reversing switch is popular on nut-running machinery assembly and disassembly.



SCALE 1"=3"

No. 32 POWER DRIVER

Adjustable Clutch

Capacity

This Driver is designed for uniform nut-tightening and machine screw driving. The rated capacity is based on maximum clutch adjustment, average conditions and properly prepared holes.

Driving Capacity—Machine Screws and Nuts—up to $\frac{5}{8}$ " diam.
Lag Screws—up to $\frac{3}{8}$ " x $4\frac{1}{2}$ ".

Specifications

No-load spindle speed	500 R.P.M.*
Net weight of complete unit	23 lbs.
Shipping weight	29 lbs.
Overall length (including chuck)	$21\frac{3}{8}$ "

Standard Equipment— $\frac{5}{8}$ " hex. "quick-change" bit chuck; one $\frac{5}{8}$ " hex. socket wrench; 2-pole automatic release trigger switch with switch locking pin; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); detachable spade handle and side pipe handle; Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications No. 352

Special Equipment

This Driver can be furnished with end switch handle, instead of side switch handle, at no extra cost. No spade handle or side pipe handle furnished with end handle unit.

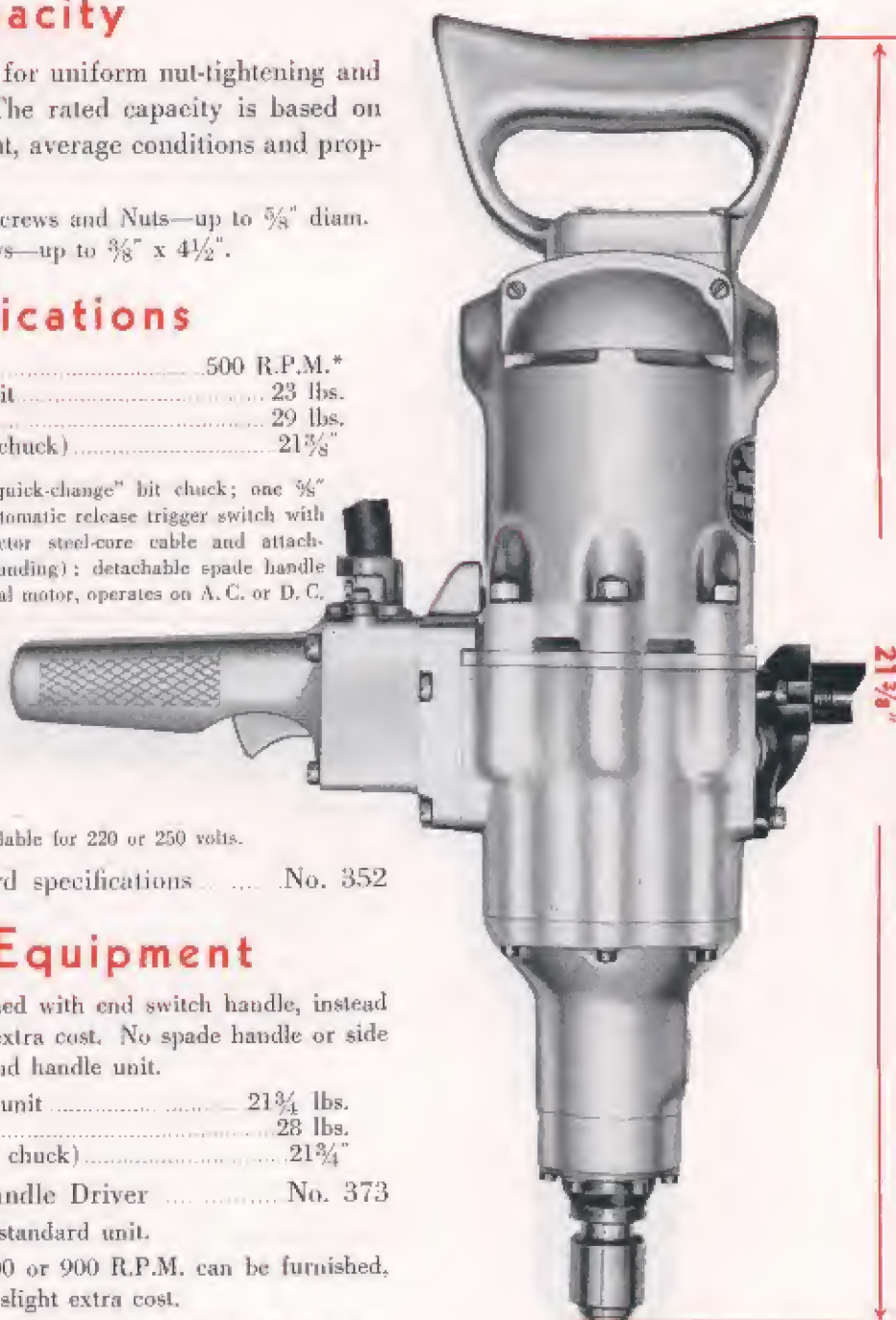
Net weight—End-Handle unit	$21\frac{3}{4}$ lbs.
Shipping weight	28 lbs.
Overall length (including chuck)	$21\frac{3}{4}$ "

Code Number for End-Handle Driver No. 373

Other specifications same as standard unit.

*Special Speeds of 350, 700 or 900 R.P.M. can be furnished, instead of standard speed, at slight extra cost.

Reversing Switch for operating Driver in reverse rotation, can be attached at small cost.



SCALE 1"=3"

Features

The Adjustable Clutch (see Page 9) makes this a most popular nut-tightening Driver. The adjustment is easily set to required tension and automatically drives each nut and machine screw to uniform tightness. It is frequently suspended for production-line work—and is usually so used with end switch handle. (See Suspensions, Page 54.) The Reversing Switch is convenient for disassembling when "knock-down" shipment is made.

No. 32 POWER DRIVER

Adjustable Clutch-90° Angle Drive

Capacity

The angle heads of this unit transmit full power to the drive-spindle. The rated capacity is based on maximum clutch adjustment, average conditions and properly prepared holes.

Driving Capacity—Machine Screws—up to $\frac{5}{8}$ " diam.
Nuts—up to $\frac{5}{8}$ " diam.

Specifications

No-load spindle speed.....500 R.P.M.*
Net weight of complete unit.....28½ lbs.
Shipping weight.....38 lbs.
Overall length (including head).....24½"

Standard Equipment—Special geared end and one of 400-Series angle heads; 2-pole automatic release trigger switch and switch locking pin; detachable spade handle and side pipe handle; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Special Equipment

This unit can be furnished with end-switch handle, instead of side-switch handle, at no extra cost. No spade handle or side pipe handle supplied with end-handle unit.

Angle Heads available for this unit and Code Numbers for side-switch and end-switch handles:

Code Numbers			Code Numbers		
Head No.	With Side	With End	Head No.	With Side	With End
	Switch	Switch		Switch	Switch
	Handle	Handle		Handle	Handle
400	248-400	182-400	451	248-451	182-451
450	248-450	182-450	452	248-452	182-452

See Pages 39 and 40 for Angle Head Specifications

*Special Speeds of 350, 700 or 900 R.P.M. can be furnished, instead of standard speed, at slight extra cost.

Reversing Switch for operating Driver in reverse rotation, can be attached at small cost.

Features

The combination of adjustable clutch (see Page 9) and Angle Heads (see Page 40) makes this a popular Driver for assembly operations with minimum working clearances. The unit is frequently suspended, and can be used very effectively with end-switch handle, as the driving torque is taken in the length of the tool. The reversing switch is used on disassembly for "knock-down" shipment.

SCALE 1"=3"

No. 42 POWER DRIVER

Positive Clutch

Capacity

The No. 42 Positive Clutch Driver is designed for heaviest duty high speed assembly of nuts and machine screws. Its rated capacity is based on average conditions and properly prepared holes.

Driving Capacity—Machine Screws—up to $\frac{7}{8}$ " diam.
Nuts—up to $\frac{7}{8}$ " diam.
Lag Screws—up to $\frac{1}{2}$ " x $5\frac{1}{2}$ ".

Specifications

No-load spindle speed 500 R.P.M.*
Net weight of complete unit 35 lbs.
Shipping weight 43 lbs.
Overall length (including chuck) $21\frac{3}{4}$ "

Standard Equipment— $\frac{5}{8}$ " hex. "quick-change" bit chuck; one $\frac{7}{8}$ " hex. socket-wrench; 2-pole safety switch in side switch handle; detachable spade handle and side pipe handle; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications.....No. 56

Special Equipment

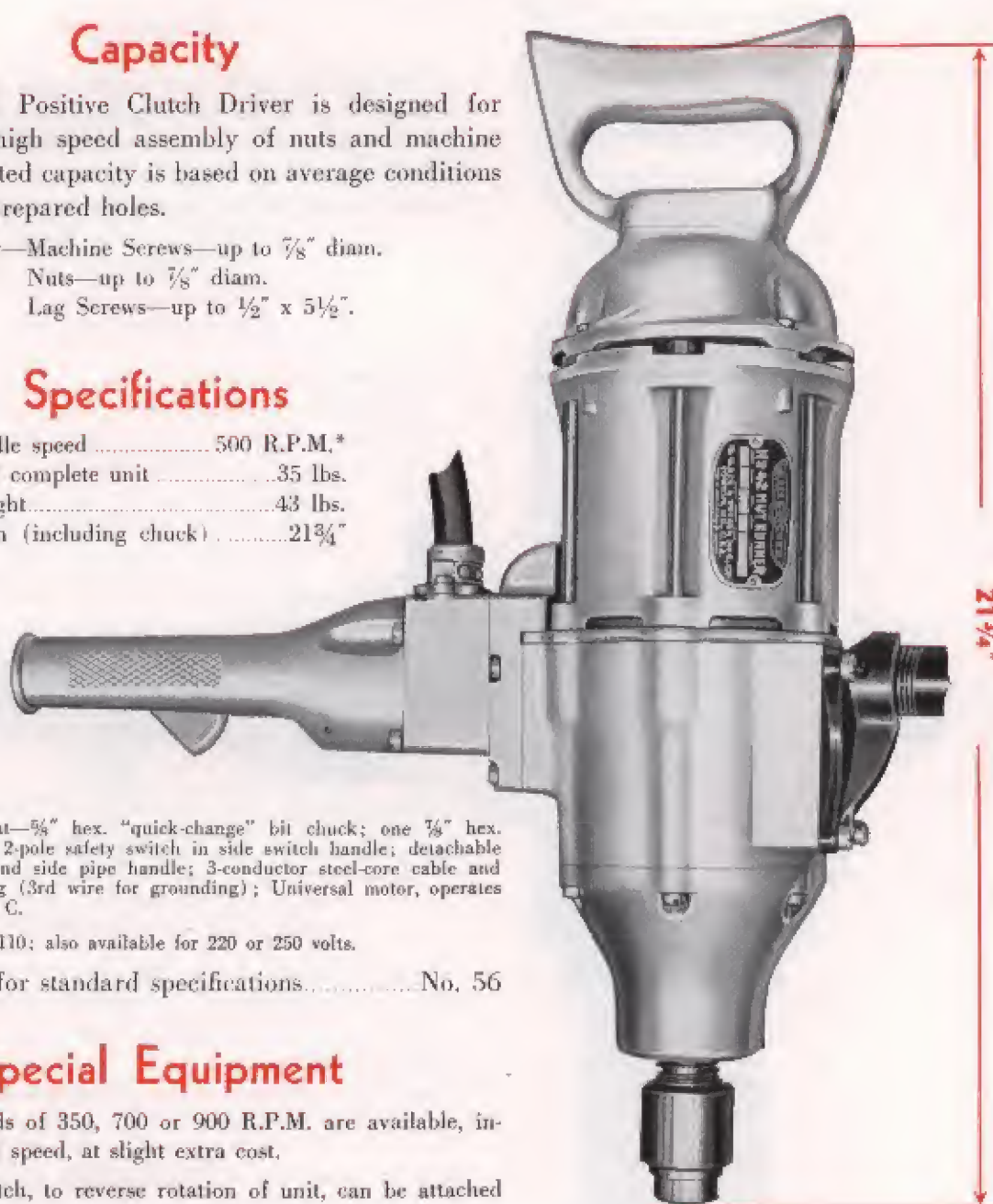
*Special Speeds of 350, 700 or 900 R.P.M. are available, instead of standard speed, at slight extra cost.

Reversing Switch, to reverse rotation of unit, can be attached at small cost.

See Page 55 for Radial and Sliding Arms.

Features

The spindle speed of this No. 42 Positive Clutch Driver, makes it the "top" performer on large machine screws and nuts. Its husky construction, long through-bolts in housings, heavy-duty gears, bearings and pin-type clutch (see Page 8) make it the best tool for constant nut-running service. Suspension equipment (Page 54) and Radial and Sliding Arms (Page 55) add to the usefulness of this Driver.



SCALE 1"=3 $\frac{1}{4}$ "

No. 42 POWER DRIVER

Adjustable Clutch

Capacity

Designed for heavy-duty, high speed nut and machine screw driving. The rated capacity is based on maximum clutch adjustment, average conditions and properly prepared holes.

Driving Capacity—Machine Screws—up to $\frac{1}{8}$ " diam.

Nuts—up to $\frac{7}{8}$ " diam.

Lag Screws—up to $\frac{1}{2}$ " x $5\frac{1}{2}$ "

Specifications

No-load spindle speed 500 R.P.M.*

Net weight of complete unit $47\frac{1}{2}$ lbs.

Shipping weight 57 lbs.

Overall length (including chuck) $26\frac{3}{8}$ "

Standard Equipment— $\frac{5}{8}$ " hex. "quick-change" bit chuck; one $\frac{3}{4}$ " hex. socket-wrench; 2-pole safety switch in side switch handle; detachable spade handle and side pipe handle; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications No. 353

Special Equipment

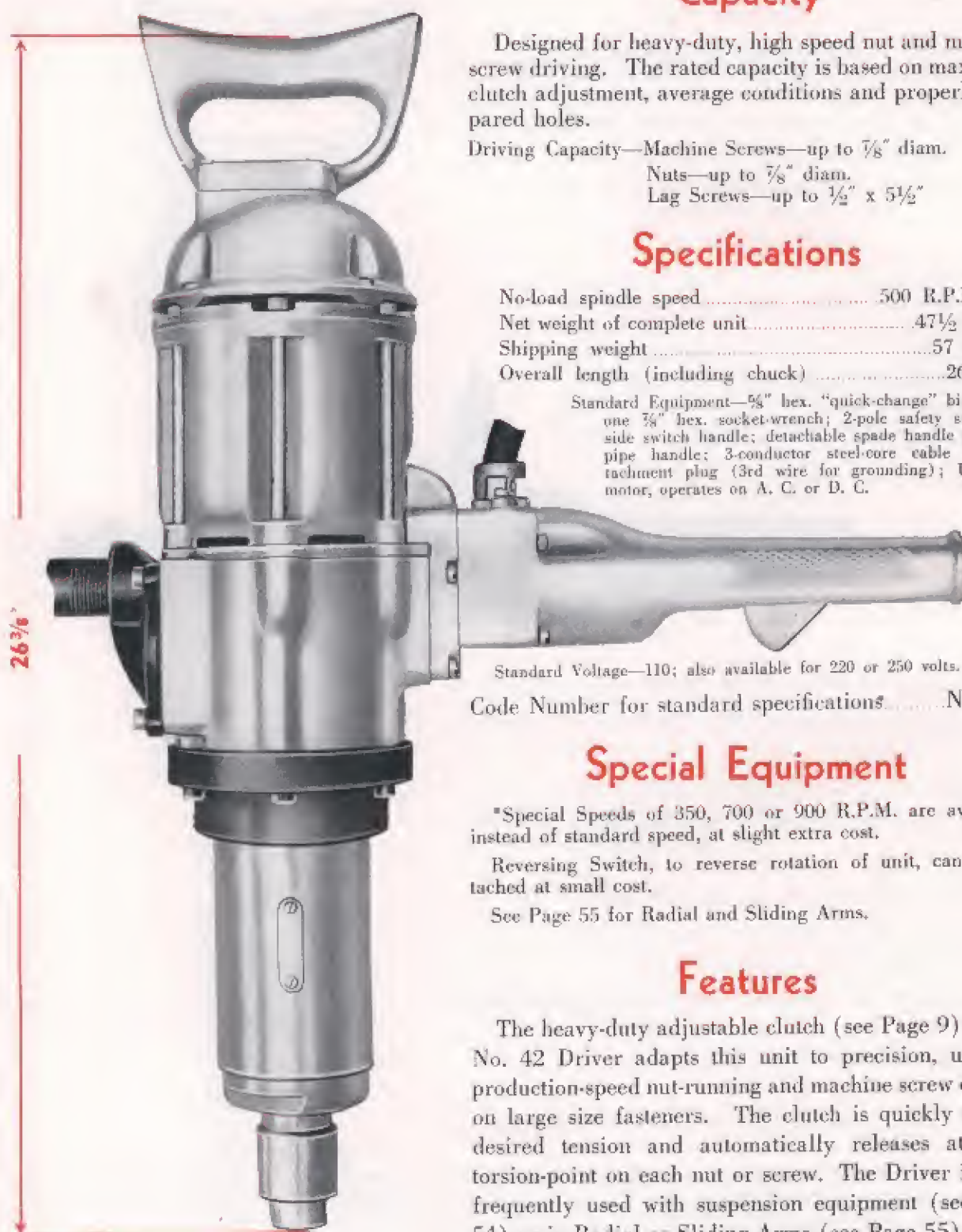
*Special Speeds of 350, 700 or 900 R.P.M. are available, instead of standard speed, at slight extra cost.

Reversing Switch, to reverse rotation of unit, can be attached at small cost.

See Page 55 for Radial and Sliding Arms.

Features

The heavy-duty adjustable clutch (see Page 9) on the No. 42 Driver adapts this unit to precision, uniform production-speed nut-running and machine screw driving on large size fasteners. The clutch is quickly set for desired tension and automatically releases at same torsion-point on each nut or screw. The Driver is most frequently used with suspension equipment (see Page 54) or in Radial or Sliding Arms (see Page 55). The reversing switch makes it possible to assemble units—then take them down for "knock-down" shipment.



SCALE 1"=3 1/4"

No. 42 POWER DRIVER

Adjustable Clutch-90° Angle Head

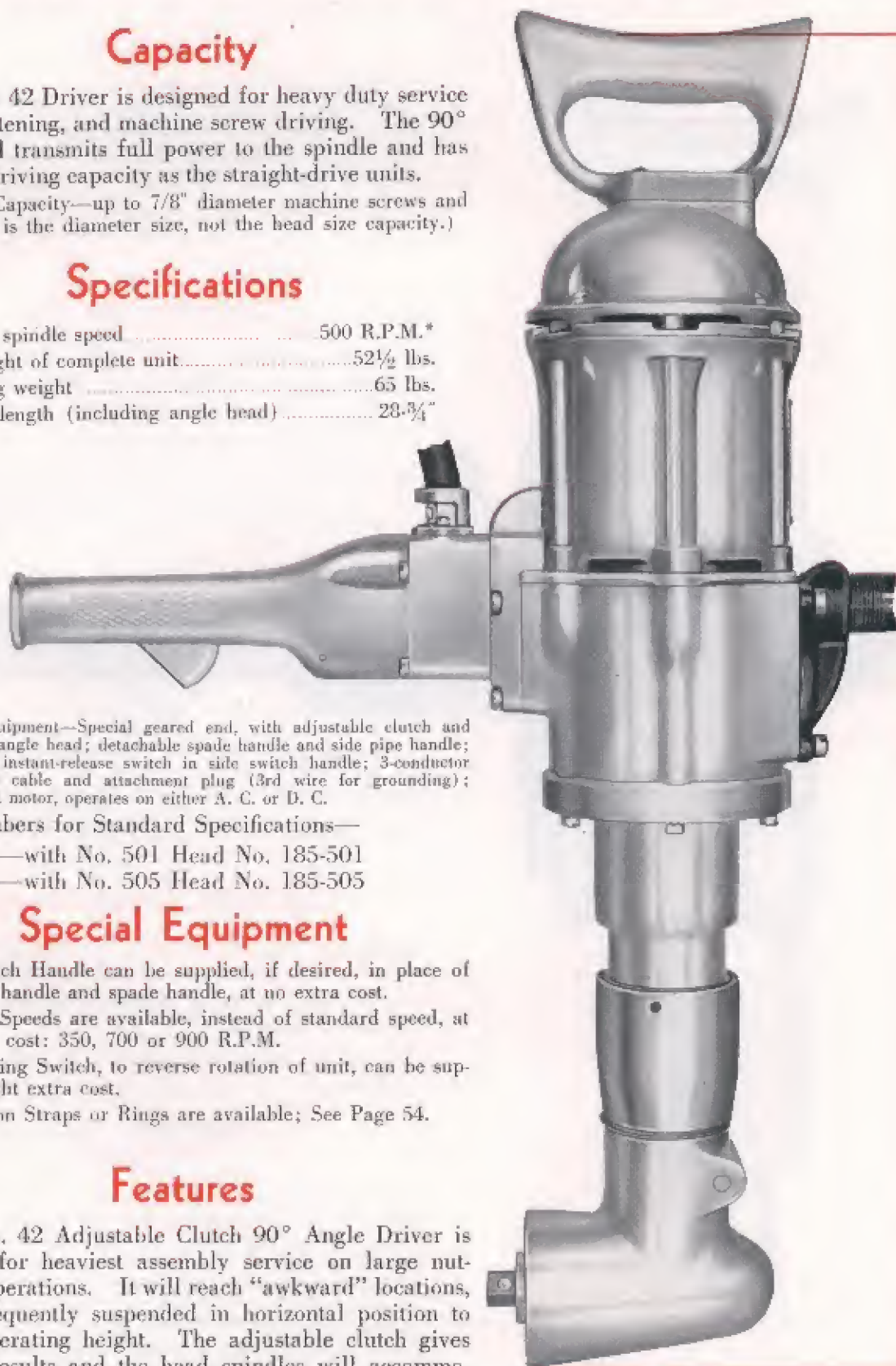
Capacity

The No. 42 Driver is designed for heavy duty service in nut-tightening, and machine screw driving. The 90° angle head transmits full power to the spindle and has the same driving capacity as the straight-drive units.

Driving Capacity—up to 7/8" diameter machine screws and nuts. (This is the diameter size, not the head size capacity.)

Specifications

No-load spindle speed	500 R.P.M.*
Net weight of complete unit.....	52½ lbs.
Shipping weight	65 lbs.
Overall length (including angle head)	28¾"



Standard Equipment—Special geared end, with adjustable clutch and one 90° angle head; detachable spade handle and side pipe handle; two-pole instant-release switch in side switch handle; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); Universal motor, operates on either A. C. or D. C.

Code Numbers for Standard Specifications—

—with No. 501 Head No. 185-501

—with No. 505 Head No. 185-505

Special Equipment

End Switch Handle can be supplied, if desired, in place of side switch handle and spade handle, at no extra cost.

*Special Speeds are available, instead of standard speed, at slight extra cost: 350, 700 or 900 R.P.M.

A Reversing Switch, to reverse rotation of unit, can be supplied at slight extra cost.

Suspension Straps or Rings are available; See Page 54.

Features

The No. 42 Adjustable Clutch 90° Angle Driver is designed for heaviest assembly service on large nut-running operations. It will reach "awkward" locations, and is frequently suspended in horizontal position to reduce operating height. The adjustable clutch gives uniform results and the head spindles will accommodate various socket sizes.

SCALE 1"=3¼"

No. 43 POWER DRIVER

Positive Clutch

Capacity

The No. 43 Driver, with highest torque and lowest spindle speed in the line, is designed for the heaviest types of nut-tightening and lag screw driving. Its rated capacity is based on average conditions, and assumes the use of properly prepared holes.

Driving Capacity—Nuts and Bolts — up to 1" diameter.
Lag Screws — up to $\frac{3}{4}$ " x 6" long.

Specifications

No-load spindle speed	90 R.P.M.*
Net weight of complete unit	30 $\frac{3}{4}$ lbs.
Shipping weight	39 $\frac{3}{4}$ lbs.
Overall length (including chuck)	22 $\frac{3}{4}$ "

Standard Equipment— $\frac{5}{8}$ " hex. "quick-change" bit chuck; one $\frac{7}{8}$ " socket wrench; detachable spade handle and side pipe handle; heavy-duty 2-pole instant-release switch in side switch handle, with switch-locking pin; 3-conductor steel-core cable

and attachment plug (3rd wire for grounding); Universal motor, operates on A. C. or D. C.

Standard Voltage—110; also available for 220 or 250 volts.

Code Number for standard specifications...No. 245

Special Equipment

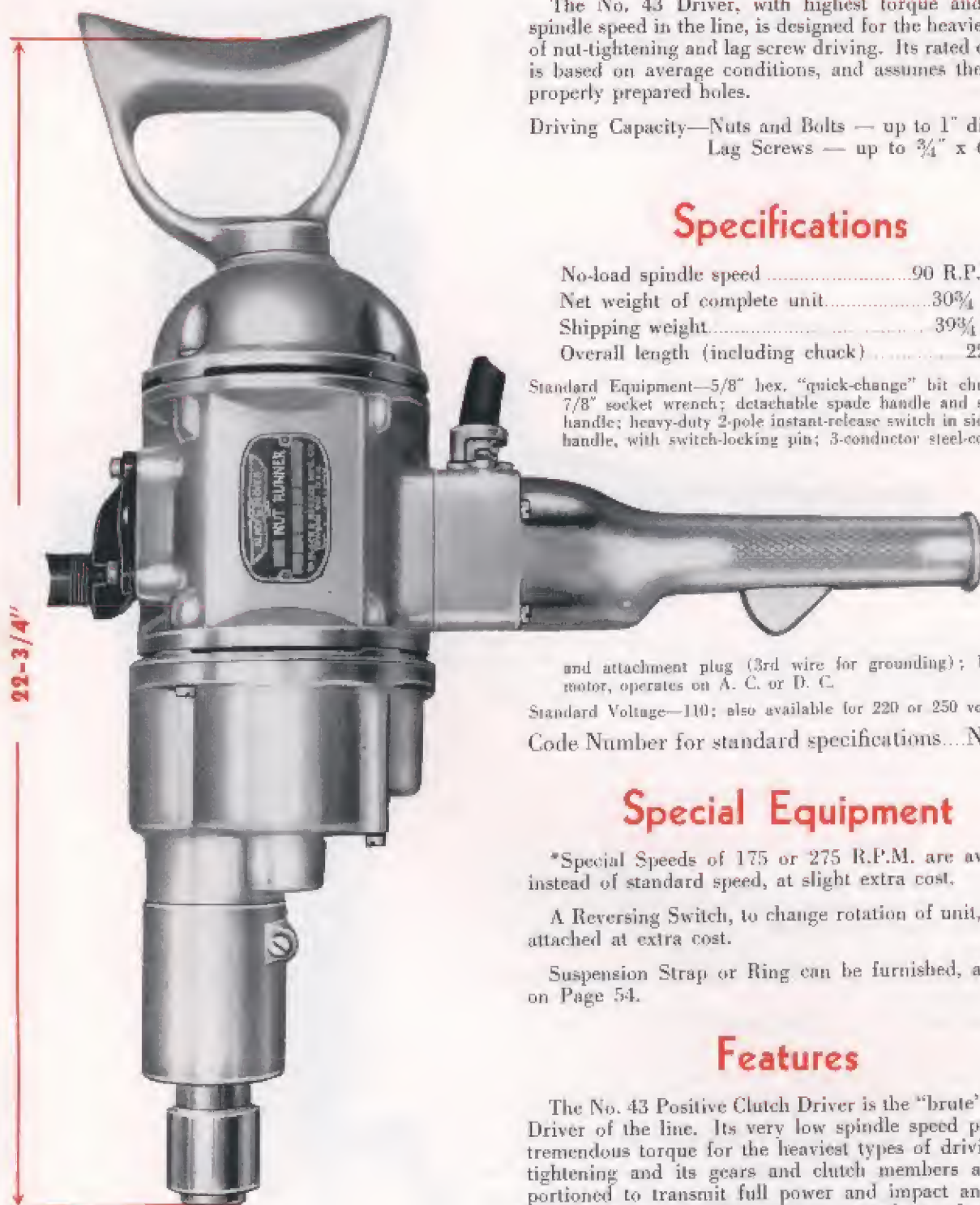
*Special Speeds of 175 or 275 R.P.M. are available, instead of standard speed, at slight extra cost.

A Reversing Switch, to change rotation of unit, can be attached at extra cost.

Suspension Strap or Ring can be furnished, as listed on Page 54.

Features

The No. 43 Positive Clutch Driver is the "brute" Power Driver of the line. Its very low spindle speed produces tremendous torque for the heaviest types of driving and tightening and its gears and clutch members are proportioned to transmit full power and impact and withstand rough usage. The reversing switch is valuable for disassembling and for "knocking-down" heavy form and timber work. If desired, it can be furnished with a solid spindle and $\frac{3}{4}$ " Jacobs geared chuck for slow-speed drilling and reaming.

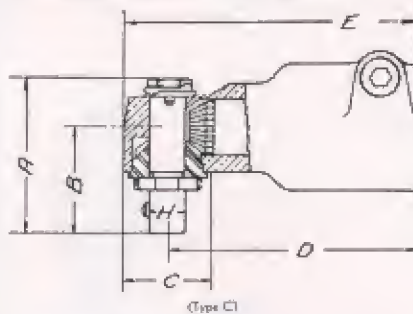


SCALE 1"=3"

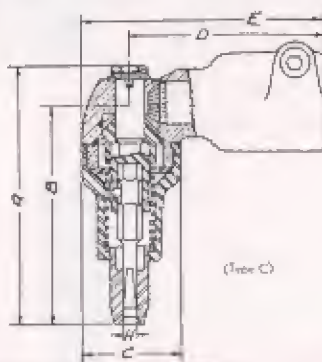
90° ANGLE HEADS

100 - Series Heads

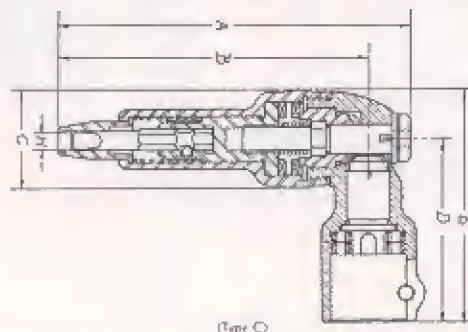
HEAD No.	A	B	C	D	E	F	G	H
100	1 1/8"	1 1/8"	3/8"	2 1/8"	2 1/8"	1 1/8"	3/4"	3/8" A. F. Hex. Socket
101	1 3/8"	1 5/8"	3/4"	2 3/8"	2 3/8"	3/8"	3/4"	1/2" A. F. Hex. Socket
102	1 3/8"	2 1/8"	3/8"	2 3/8"	2 3/8"	1 1/8"	3/4"	1/8" A. F. Sq. Socket
104	1 3/8"	1 5/8"	3/8"	2 3/8"	2 3/8"	1 1/8"	3/4"	3/8" A. F. Hex. Socket
106	1 3/8"	1 1/8"	3/8"	2 3/8"	2 3/8"	3/8"	3/4"	3/8" A. F. Hex. Socket
107	1 3/4"	1 1/8"	3/8"	2 3/8"	2 3/8"	1 1/8"	3/8"	1/2" A. F. Hex. Socket
108	1"	1 1/8"	3/8"	2 3/8"	2 3/8"	3/4"	3/8"	1/2" A. F. Hex. Socket



HEAD No.	A	B	C	D	E	H
103	1 3/8"	1 1/8"	3/8"	2 3/8"	2 3/8"	3/8" Sq. Shank
105	1 3/8"	1 1/8"	3/8"	2 3/8"	2 3/8"	3/4" Sq. Shank

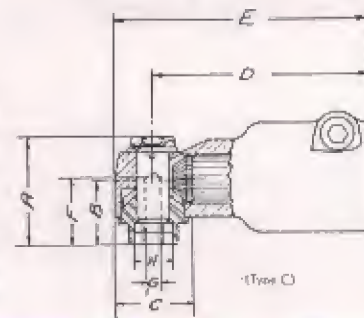


HEAD No.	A	B	C	D	E	H
100	3 5/8"	2 3/8"	1 1/4"	2 1/8"	3 1/8"	# 13208 Bit
151	3 5/8"	2 3/8"	1 1/4"	2 1/8"	3 1/8"	No. 13207 Bit
152	3 5/8"	2 3/8"	1 1/4"	2 1/8"	3 1/8"	No. 15475 Bit

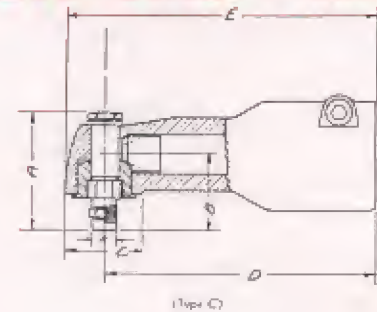


HEAD No.	A	B	C	D	E	H
156	4 1/8"	4 1/8"	1 3/8"	2 1/4"	3 1/4"	No. 13207 Bit

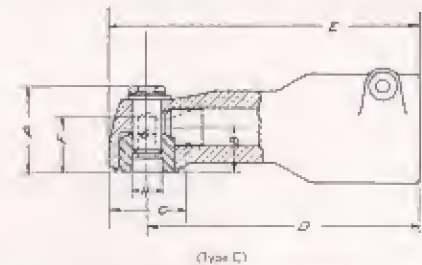
This head has dead spindle.



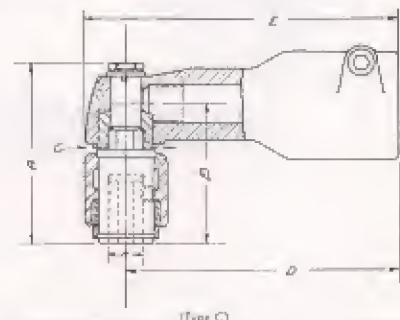
200 - Series Heads



HEAD No.	A	B	C	D	E	H
200	1 3/8"	1 1/4"	1 1/8"	4 1/8"	4 1/8"	1/2" Sq. Shank
202	1 3/4"	1 3/8"	1 1/8"	4 1/8"	4 1/8"	3/8" Sq. Shank



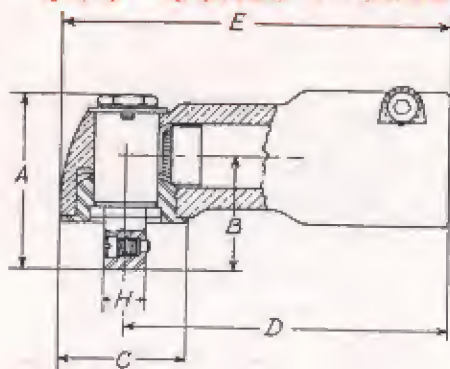
HEAD No.	A	B	C	D	E	F	G	H
201	1 3/8"	2 1/8"	1 1/8"	4 1/8"	4 1/8"	3/8"	3/8"	3/8" A. F. Hex. Socket
204	1 1/8"	1 1/8"	1 1/8"	4 1/8"	4 1/8"	3/8"	3/8"	1/8" A. F. Hex. Socket
205	1 1/8"	1 1/8"	1 1/8"	4 1/8"	4 1/8"	3/8"	3/8"	1/2" A. F. Hex. Socket



HEAD No.	A	B	C	D	E	H
250	2 3/8"	2 3/8"	1 1/8"	4 1/8"	4 1/8"	3/8" A. F. Hex. Chuck

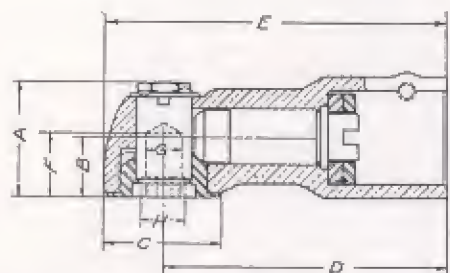
90° ANGLE HEADS-continued

300-Series Heads



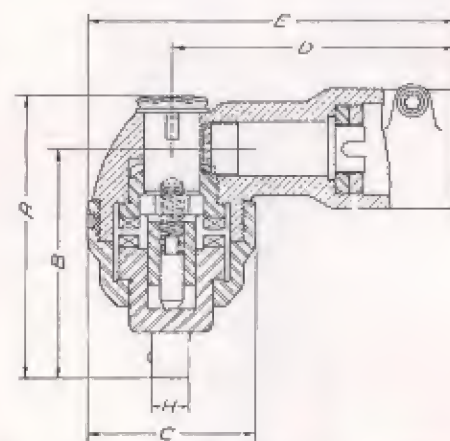
(Type C)

HEAD No.	A	B	C	D	E	H
300	2 3/8"	1 3/4"	1 5/8"	3 3/8"	4 5/8"	1/2" Sq. Shank



(Type C)

HEAD No.	A	B	C	D	E	F	G	H
301	1 1/2"	1 1/8"	1 3/8"	1 3/8"	4 3/8"	3/8"	1/2"	1/2" A. F. Hex. Socket
302	1 1/8"	1 1/8"	1 3/8"	1 3/8"	4 3/8"	1 1/8"	1/2"	3/4" A. F. Hex. Socket
307	1 1/8"	1 1/8"	1 3/8"	1 3/8"	4 3/8"	3/8"	1/2"	1/2" A. F. Sq. Socket

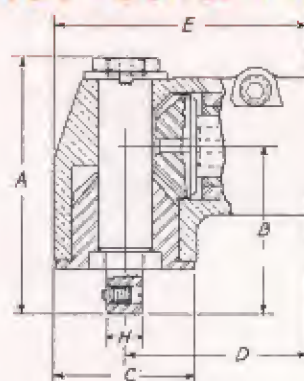


(Type C)

HEAD No.	A	B	C	D	E	H
305	3 1/8"	3 1/8"	2 1/4"	3 3/8"	4 3/8"	3/4" Sq. Shank

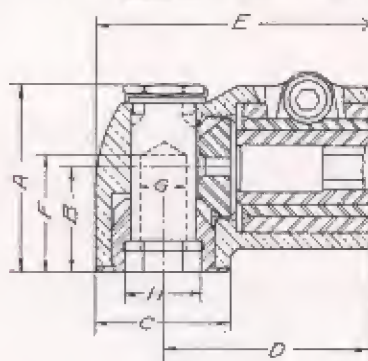
This head has dead spindle.

400-Series Heads



(Type B)

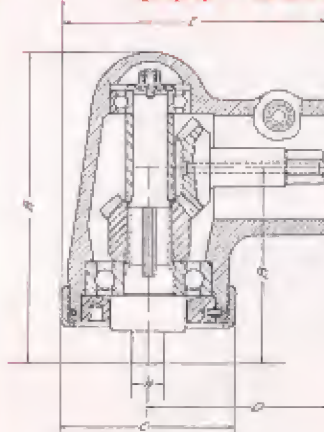
HEAD No.	A	B	C	D	E	H
400	5 5/8"	2 3/8"	2"	2 3/8"	3 3/8"	1/2" Sq. Shank



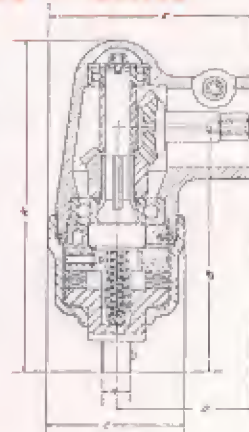
(Type B)

HEAD No.	A	B	C	D	E	F	G	H
450	2 1/8"	1 1/8"	1 3/8"	2 1/8"	3 1/8"	1 1/8"	1 1/8"	3/4" A. F. Hex. Socket
451	2 1/8"	1 3/8"	1 3/8"	2 1/8"	3 1/8"	1 1/8"	1 1/8"	3/8" A. F. Hex. Socket
452	2 1/8"	1 3/8"	1 3/8"	2 1/8"	3 1/8"	1 1/8"	1 1/8"	3/8" A. F. Hex. Socket

500-Series Heads



501



505*

HEAD No.	A	B	C	D	E	H
501	6 1/8"	2 3/8"	3 3/8"	3 3/8"	5 1/8"	1/2" Square Shank
505	8 1/8"	6 3/8"	3 3/8"	3 3/8"	5 1/8"	3/4" Square Shank

* This head has dead spindle.

Standard Screwdriver BITS

for Slotted Head Screws



Bits for Scrugun and Torsimeter (with 1/4" hexagon shanks)

These bits are equipped with 1/4" hexagon shanks to fit the Quick-Change bit chuck of the Torsimeter and Scrugun. The bits can be used without Finders (fig. A), but for fast operation and to protect surfaces the Finder (fig. B) should be used. When used without Finder, the Protecting Sleeve (fig. C) should be used. Finders and Protecting Sleeves for standard length bits are supplied as standard equipment with the Drivers. Extra length bits, with integral Finder (fig. D) are supplied in most sizes. See Page 42 for complete list of standard bits and the size screws they will drive.

Bits for Nos. 12 and 22 Drivers (with 7/16" hexagon shanks)

These bits are equipped with 7/16" hexagon shank to fit the Quick-Change chucks of the Nos. 12 and 22 Drivers. They are available either with Finders (fig. E) or without Finders (fig. F), and can be supplied for driving all types of slotted head screws as indicated in the table on Page 43. Various length shanks are available for special operations.



Bit Extensions

For many operations where a "long-reach" is desired, a Screwdriver Bit Extension with a standard length bit is preferable to the extra length bits. Bit replacement costs will be greatly reduced with this combination.

These Extensions are available in various lengths as indicated in the table below and can be supplied either with 1/4" hexagon shank for Torsimeter and Scrugun, or with 7/16" hexagon shank for the Nos. 12 and 22 Drivers.

Extension Length	Shank Size	Cat. No.	Shank Size	Cat. No.
4"	1/4"	22581	7/16"	15023
6"	1/4"	22539	7/16"	14989
8"	1/4"	22540	7/16"	5287
10"	1/4"	22323	7/16"	5288



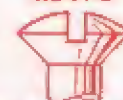
SLOTTED HEAD



COUNTERSUNK
FLAT



ROUND



COUNTERSUNK
OVAL



BINDING



FILLISTER



TRUSS



WASHER



STOVE

Adaptors

Where it is desired to use Screwdriver Bits or Socket Wrenches with 7/16" hex. shanks in the Nos. 32, 42 or 43 Drivers, an Adaptor is necessary to reduce the Driver chuck from 5/8" to 7/16" capacity. This Adaptor is available as follows:

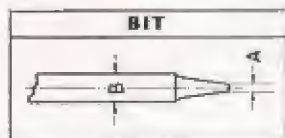
No. 24880—5/8" to 7/16" Bit Adaptor.

Bits with 1/4" Hex. Shanks -- for Torsimeters and Scruguns

Screw Sizes and Types

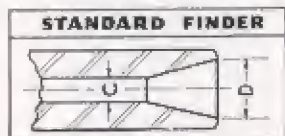
Special Blank Finder No. **	D	C	Stand- ard Finder No.	B	A	Exten- sion *	Bit No.	Bit and Stan'd. Finder Assem. No.	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11
24475	7/32"	.140"	18050†	.138"	.020"	1 1/8"	18051											
24476	13/64"	.140"	22397†	.138"	.020"	2 3/4"	22396											
24477	13/64"	.140"	23079†	.138"	.020"	2 3/4"	22396											
24478	13/64"	.140"	20482†	.138"	.020"	1 1/8"	18051											
24479	5/16"	.187"	13210†	.185"	.028"	1 1/8"	13208											
24480	1/4"	.187"	15585†	.185"	.028"	1 1/8"	13208											
24466	5/16"	.187"	5103	.185"	.028"	2 3/4"	17688	17690										
24466	5/16"	.187"	5103	.185"	.028"	5 1/4"	22108	22111										
24481	3/8"	.250"	13209†	.247"	.034"	1 1/8"	13207											
24482	11/32"	.250"	16529†	.247"	.034"	1 1/8"	13207											
24407	25/64"	.250"	5105	.247"	.034"	2 3/4"	13353	13356										
24407	25/64"	.250"	5105	.247"	.034"	5 1/4"	13470	13469										
24481	3/8"	.250"	13209†	.247"	.037"	1 1/8"	24461											
24482	11/32"	.250"	16529†	.247"	.037"	1 1/8"	24461											
24483	3/8"	.312"	15469†	.308"	.037"	1 1/8"	15475											
24484	13/32"	.312"	23493†	.308"	.037"	2 3/4"	23494											
24468	15/32"	.312"	5107†	.308"	.037"	2 3/4"	18594	18593										
24483	3/8"	.312"	15469†	.308"	.043"	1 1/8"	24462											
24485	7/16"	.379"	16773†	.375"	.041"	1 1/8"	16772											
24469	33/64"	.379"	5109†	.375"	.041"	2 3/4"	21730	21731										
24485	17/32"	.379"	16773†	.375"	.047"	1 1/8"	24892											

EXPLANATION OF MARKS AND TERMS



†Used with Scrugun only.

†Used with No. 3 Torsimeter only.



STANDARD BIT & FINDER



With 7/16" Hex. Shank



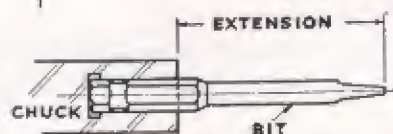
** Blank Finder 1/4" Longer than Standard Finder. End to be machined by customer to desired dimensions, and heat treated as follows:

Heat slowly to a **dull cherry red**.

Quench in **clean, cool water**.

Re-heat immediately to a **light blue**.

Quench in **warm water**.



*Extension is the projection of bit from the end of the chuck.

LEGEND

W = WOOD SCREWS, all types.

M = MACHINE SCREWS, all types.

Mx = MACHINE SCREWS, except Fillister Head.

F = FILLISTER HEAD MACHINE SCREWS.

S = SHEET METAL SCREWS, all types.

Sx = SHEET METAL, except Stove Head.

St = STOVE HEAD SHEET METAL SCREWS.

EXPLANATION

To use the above charts in selecting correct screwdriver bits, first find the size and type of screw to be driven, in the center section of the chart. If the bit is to be used in a Torsimeter or Scrugun, follow the horizontal line to the left for bits with 1/4" shanks; if used with Nos. 12 or 22 Drivers, follow the line to the right for bits with 7/16" shanks. Bits either with or without finders are listed in most classifications and various length bits are shown for varying assembly requirements. If special screw heads are used, requiring special finders, use a blank finder as listed in the outside column and fashion it to your needs as per instructions to the left.

Screw Sizes and Types

Bits with 7/16" Hex. Shanks -- for No. 12 and No. 22 Drivers

No. 11	No. 12	No. 14	1/4 in.	No. 16	No. 18	5/16 in.	No. 20	No. 24	3/8 in.	Bit and Stan'd. Finder Assem. No.	Bit No.	Exten- sion *	A	B	Stand- ard Finder No.	C	D	Special Blank Finder No. **
										5345	5104	2 1/2"	.028"	.185"	5103	.189"	5/16"	24466
										15085	15049	4"	.028"	.185"	5103	.189"	5/16"	24466
										15086	15050	6"	.028"	.185"	5103	.189"	5/16"	24466
										15087	15051	8"	.028"	.185"	5103	.189"	5/16"	24466
										15088	15052	10"	.028"	.185"	5103	.189"	5/16"	24466
										5346	5106	2 1/2"	.034"	.246"	5105	.250"	25/64"	24467
										15089	15053	4"	.034"	.246"	5105	.250"	25/64"	24467
										15090	15054	6"	.034"	.246"	5105	.250"	25/64"	24467
										15091	15055	8"	.034"	.246"	5105	.250"	25/64"	24467
										15092	15056	10"	.034"	.246"	5105	.250"	25/64"	24467
										24452	24451	2 1/2"	.037"	.246"	5105	.250"	25/64"	24467
										5330	5108	2 1/2"	.037"	.308"	5107	.312"	15/32"	24468
										15093	15057	4"	.037"	.308"	5107	.312"	15/32"	24468
										15094	15058	6"	.037"	.308"	5107	.312"	15/32"	24468
										15095	15059	8"	.037"	.308"	5107	.312"	15/32"	24468
										15096	15060	10"	.037"	.308"	5107	.312"	15/32"	24468
										24454	24453	2 1/2"	.043"	.308"	5107	.312"	15/32"	24468
										5343	5110	2 1/2"	.041"	.375"	5109	.380"	33/64"	24469
										15097	15061	4"	.041"	.375"	5109	.380"	33/64"	24469
										15098	15062	6"	.041"	.375"	5109	.380"	33/64"	24469
										15099	15063	8"	.041"	.375"	5109	.380"	33/64"	24469
										15100	15064	10"	.041"	.375"	5109	.380"	33/64"	24469
										24456	24455	2 1/2"	.047"	.375"	5109	.380"	33/64"	24469
										5344	5112	2 1/2"	.043"	.402"	5111	.406"	9/16"	24470
										15101	15065	4"	.043"	.402"	5111	.406"	9/16"	24470
										15102	15066	6"	.043"	.402"	5111	.406"	9/16"	24470
										15103	15067	8"	.043"	.402"	5111	.406"	9/16"	24470
										15104	15068	10"	.043"	.402"	5111	.406"	9/16"	24470
										24458	24457	2 1/2"	.050"	.437"	5113	.442"	37/64"	24471
										5329	5114	2 1/2"	.047"	.437"	5113	.442"	37/64"	24471
										15105	15069	4"	.047"	.437"	5113	.442"	37/64"	24471
										15106	15070	6"	.047"	.437"	5113	.442"	37/64"	24471
										15107	15071	8"	.047"	.437"	5113	.442"	37/64"	24471
										15108	15072	10"	.047"	.437"	5113	.442"	37/64"	24471
										5364	5116	2 3/4"	.048"	.500"	5115	.505"	21/32"	24472
										15109	15073	4"	.048"	.500"	5115	.505"	21/32"	24472
										15110	15074	6"	.048"	.500"	5115	.505"	21/32"	24472
										15111	15075	8"	.048"	.500"	5115	.505"	21/32"	24472
										15112	15076	10"	.048"	.500"	5115	.505"	21/32"	24472
										24460	24459	2 3/4"	.065"	.500"	5115	.505"	21/32"	24472
										5366	5118	2 3/4"	.051"	.563"	5117	.567"	23/32"	24473
										15113	15077	4"	.051"	.563"	5117	.567"	23/32"	24473
										15114	15078	6"	.051"	.563"	5117	.567"	23/32"	24473
										15115	15079	8"	.051"	.563"	5117	.567"	23/32"	24473
										15116	15080	10"	.051"	.563"	5117	.567"	23/32"	24473
										5369	5120	2 3/4"	.061"	.625"	5119	.630"	25/32"	24474
										15117	15081	4"	.061"	.625"	5119	.630"	25/32"	24474
										15118	15082	6"	.061"	.625"	5119	.630"	25/32"	24474
										15119	15083	8"	.061"	.625"	5119	.630"	25/32"	24474
										15120	15084	10"	.061"	.625"	5119	.630"	25/32"	24474

See Page 57 for diagrams showing correct fit of bit to screw head; also suggestions for correct sharpening of bits.

SCREW DRIVER BITS

for Phillips Recessed Head Screws



PHILLIPS HEAD

To drive all types of screws with the special Phillips recessed head, a special bit is required to fit the cross-form slot of this head. Four different slot sizes are designated as standard and marked Nos. 1, 2, 3 and 4. Thus, several screw sizes are covered by one slot size. Tables No. 1 and No. 2 show the ranges and types of screws so grouped. In Table No. 3, we list the special bits for Torsimeter, Scruguns and Nos. 12 and 22 Drivers for these various slot sizes.



Table No. 1

WOOD SCREWS				
Screw Size	SIZE RECESS IN VARIOUS SCREW HEADS			
	Flat Head	Round Head	Oval Head	Fillister Head
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	2	2	2	2
6	2	2	2	2
7	2	2	2	2
8	2	2	2	2
9	2	2	2	2
10	3	3	3	3
11	3	3	3	3
12	3	3	3	3
14	3	3	3	3
16	3	3	3	3
18	4	4	4	4
20	4	4	4	4
24	4	4	4	4

Table No. 2

MACHINE SCREWS						
Screw Size	SIZE RECESS IN VARIOUS SCREW HEADS					
	Flat Head	Round Head	Oval Head	Fillister Head	Blind Head	Truss Head
2	1	1	1	1	1	....
3	1	1	1	1	1	....
4	1	1	1	1	1	....
5 or 3/4	2	2	2	2	2	....
6	2	2	2	2	2	....
8 or 3/8	2	2	2	2	2	2
10	2	2	2	2	2	2
12 or 1/2	3	3	3	3	3	3
1/4	3	3	3	3	3	3
3/8	4	4	4	4	4	4
1/2	4	4	4	4	4	4
5/8	4	4	4	4	4	4
3/4	4	4	4	4	4	4

Table No. 3

Slot Size	Cat. No.	Unit Used With	Slot Size	Cat. No.	Unit Used With
No. 1 1/4" hex. shank	17922	Torsimeter and Scruguns	No. 3 3/4" hex. shank	21366	Torsimeter and Scruguns
No. 1 3/8" hex. shank	18938	Nos. 12 and 22 Drivers	No. 3 1/2" hex. shank	17925	Nos. 12 and 22 Drivers
No. 2 1/2" hex. shank	17923	Torsimeter and Scruguns	No. 4 1/2" hex. shank	17926	Nos. 12 and 22 Drivers
No. 2 3/4" hex. shank	17924	Nos. 12 and 22 Drivers			

SHEET METAL SCREWS

Screw Size	Flat Head	Round Head	Oval Head	Fillister Head	Blind Head	Truss Head
2	1	1	1	1	1	....
3	1	1	1	1	1	....
4	1	1	1	1	1	....
5	2	2	2	2	2	....
6	2	2	2	2	2	....
7	2	2	2	2	2	....
8	2	2	2	2	2	....
10	2	2	2	2	2	....
12	3	3	3	3	3	....
14	3	3	3	3	3	....
1/2	4	4	4	4	4	....
3/4	4	4	4	4	4	....

for Hollow Head Cap Screws and Set Screws



HEX SOCKET

This special type of screw has a driving recess consisting of a hexagon shaped socket requiring a bit with a hexagon driving end. We can supply correct bits for driving these special screws in both the 1/4" hex. shank and 7/16" hex. shank size. Thus these bits are adapted to all Drivers from the Torsimeter to the No. 22.

Catalog Number	Diameter Across Flat On Driving End Of Bit	Extension of Bit From Chuck	SIZE SCREWS WITH WHICH BIT IS USED		
			Cap Screws	Set Screws	Pipe Plugs
18577 18578 18579	HEX. DRIVE BITS WITH 1/4" HEX. SHANKS				
	1/8"	1-1/4"	No. 8	1/4"	.....
	5/32"	1-1/4"	No. 10 and No. 12	5/16"	.....
	3/16"	1-1/4"	1/4"	3/8"	1/8"
17892 19223 18977 23492	HEX. DRIVE BITS WITH 7/16" HEX. SHANKS				
	3/16"	2"	1/4"	3/8"	1/8"
	7/32"	2"	5/16"	7/16"	
	5/16"	2"	3/8" and 7/16"	5/8"	3/8"
	3/8"	2"	1/2" and 9/16"	3/4"	1/2"



Quick Reference Data

on SELF-TAPPING SCREWS

Recommended Hole Sizes
for Type "Z" Hardened Self-Tapping Screws and Hex Cap Screws.

FRAMING OF JOISTS	IN ANGLES STEEL					IN SHEET ALUMINUM					IN BULKHEADS OF ALUMINUM, DGS. WHITE METAL, ETC.					IN BAKELITE, GUMMI AND OTHER PLASTICS				
	No. of Screws (1/2" dia.)	Thickness of Metal (1/8" to 1/2")	Depth of Hole (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	No. of Screws (1/2" dia.)	Thickness of Metal (1/8" to 1/2")	Depth of Hole (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	No. of Screws (1/2" dia.)	Thickness of Metal (1/8" to 1/2")	Depth of Hole (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	No. of Screws (1/2" dia.)	Thickness of Metal (1/8" to 1/2")	Depth of Hole (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")	Dist. of Screws (1/8" to 1/2")
No. 2	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 4	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 6	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 7	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 8	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 10	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 12	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
No. 14	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"
	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"	20	.015"	.063"	No. 32	.025"

Styles of Self-Tapping Screws

TYPE "A"

For joining light gauges of sheet metal and making fastenings to sheet metal up to 18 gauge (.050"). Ask screw manufacturer for bulletin giving hole size recommendations.



TYPE "Z"

For joining light and heavy gauges of sheet metal and making fastenings to sheet metal up to 6 gauge (.203"); also for making fastenings to aluminum and die castings, plastics, etc.



HEX. CAP

For making fastenings to sheet metal up to 6 gauge (.203"); to steel plate and structural shapes up to 1/2" thick; and to aluminum and die castings, plastics, etc.



TYPE "F"

For making fastenings to sheet metal, cast iron, aluminum and die castings, plastics, etc.



Recommended Hole Sizes For Type "F" Hardened Self-Tapping Screws

Machine Screw Size	MALLEABLE AND GREY IRON CASTINGS				BAKELITE AND OTHER PLASTICS			
	Diam. Hole Required	Drill Size	Min. Penetration	Max. Penetration	Diam. Hole Required	Drill Size	Min. Penetration	Max. Penetration
No. 4-40	.099"	No. 39	1/8"	1/4"	.098"	No. 40	1/4"	5/16"
No. 6-32	.120"	No. 31	3/16"	1/4"	.113"	No. 33	1/4"	5/16"
No. 8-32	.147"	No. 26	3/16"	1/4"	.144"	No. 27	5/16"	1/2"
No. 10-32	.169"	No. 18	1/4"	3/8"	.166"	No. 19	3/8"	1/2"
No. 10-24	.169"	No. 18	1/4"	3/8"	.161"	No. 20	3/8"	1/2"
No. 1/4"-20	.228"	No. 1	5/16"	3/8"	.228"	No. 1	3/8"	5/8"

• Also available with Phillips Recessed Heads.

Note: To obtain satisfactory results, the holes must be neither too large nor too small. In most cases the hole sizes shown in the table will be found suitable. But, if the material happens to be very hard, it may be necessary to use a size larger drill; in very soft material, a size smaller drill may have to be used.

Ask screw manufacturer for bulletin giving hole size recommendations.

SCREW DIAMETERS

and the IMPORTANCE of PILOT HOLES

All charts and ratings of Power Drivers are based on the use of correct size pilot holes in the screwdriving operation. This has not been done to "favor" the Driver, but to insure a satisfactory and lasting job of fastening an assembly.



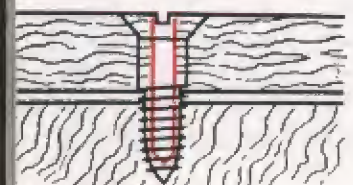
SKETCH No. 1



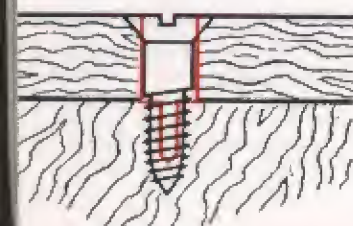
SKETCH No. 2



SKETCH No. 3



SKETCH No. 4



SKETCH No. 5

It is all too common practice in driving wood screws to force them into the wood without using a pilot hole. The sketches at the left indicate the dangers of this practice and the advantages to be gained by using the correct size pilot and shank clearance holes in all wood screw assembly.

Sketch No. 1 shows how, in end grain driving, the grain tends to force the screw off its perpendicular path.

Sketch No. 2 shows the tendency to split the wood in side grain driving. The wood screw does not remove material but merely compresses it. This compression takes place along lines of least resistance and the wood easily splits, minimizing the holding power of the screw and spoiling appearance.

Sketch No. 3 shows a correct pilot hole (indicated by red circle) giving the screw holding power in a full 360° circumference and preventing splitting.

Sketch No. 4 shows the disadvantage of drilling only a pilot hole the size of the screw root diameter. This condition increases the load on the Driver and has a tendency to separate the two pieces rather than pull them together.

Sketch No. 5 shows correct size pilot and shank clearance hole.

NOMINAL SIZE	ACTUAL SIZE	MAJOR DIAM. DECIMAL	NEAREST FRACTION
0	○	.060	$\frac{1}{16}$
1	○	.073	$\frac{5}{64}$ -
2	○	.086	$\frac{5}{64}$ +
3	○	.099	$\frac{3}{32}$
4	○	.112	$\frac{7}{64}$
5	○	.125	$\frac{1}{8}$
6	○	.138	$\frac{9}{64}$
7	○	.151	$\frac{5}{32}$ -
8	○	.164	$\frac{5}{32}$ +
9	○	.177	$\frac{11}{64}$
10	○	.190	$\frac{3}{16}$
11	○	.203	$\frac{13}{64}$
12	○	.216	$\frac{7}{32}$
14	○	.242	$\frac{15}{64}$
16	○	.268	$\frac{17}{64}$
18	○	.294	$\frac{19}{64}$
20	○	.320	$\frac{21}{64}$
24	○	.372	$\frac{3}{8}$

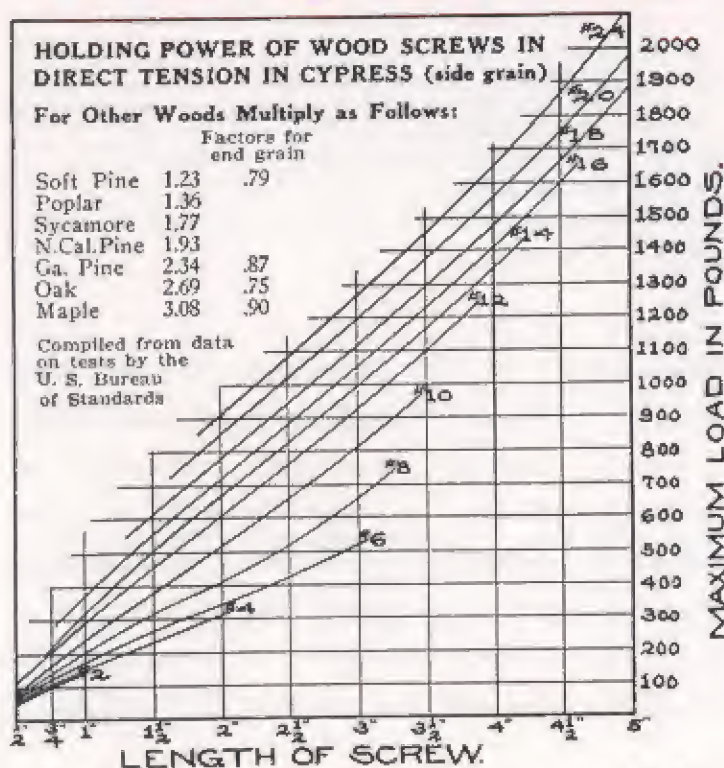
Pilot and Clearance Holes

---FOR WOOD SCREWS

When assembling parts of hard wood, to make the driving of slotted screws easier, or to prevent splitting, a shank clearance hole should be bored in the first piece large enough to insert the screw without forcing. In the second piece, a pilot hole should be bored equal in size to 70% of the root diameter of the screw for soft woods; 90% for hard woods. The drill sizes to use in boring these holes, in both hard and soft woods, are indicated in the table below. The auger bit to use for counter-boring, when the head of the screw is to be sunk below the surface of the wood for plugging, is given in the last column.

SIZE OF SCREW	BIT OR DRILL SIZES						AUGER BIT for Counter- sinks
	SHANK HOLES		PILOT HOLES				
			Hard Wood		Soft Wood		
	Drill Number or Letter	Drill Size Nearest Fraction	Drill Number or Letter	Drill Size Nearest Fraction	Drill Number or Letter	Drill Size Nearest Fraction	
0	52	1/16"	70	1/32"	75	1/64"	—
1	47	5/64"	66	1/32"	71	1/32"	—
2	42	3/32"	56	3/64"	65	1/32"	3
3	37	7/64"	54	1/16"	58	3/64"	4
4	32	7/64"	52	1/16"	55	3/64"	4
5	30	1/8"	49	5/64"	53	1/10"	4
6	27	9/64"	47	5/64"	52	1/10"	5
7	22	5/32"	44	3/32"	51	1/10"	5
8	18	11/64"	40	3/32"	48	5/64"	6
9	14	3/16"	37	7/64"	45	5/64"	6
10	10	3/16"	33	7/64"	43	3/32"	6
11	4	13/64"	31	1/8"	40	3/32"	7
12	2	7/32"	30	1/8"	38	7/64"	7
14	D	1/4"	25	9/64"	32	7/64"	8
16	I	17/64"	18	5/32"	29	9/64"	9
18	N	19/64"	13	3/16"	26	9/64"	10
20	P	21/64"	4	13/64"	19	11/64"	11
24	V	3/8"	1	7/32"	15	3/16"	12

Holding Power of Wood Screws



Based upon studies made by the Bureau of Standards, the Table at the left indicates the ultimate holding power of a given size of screw in a given wood. In choosing between two adequate screws, use the smaller diameter and longer length when practicable.

For a given length of screw axially loaded, the holding power increases with the diameter to a certain length, beyond which an increase in diameter decreases the holding power.

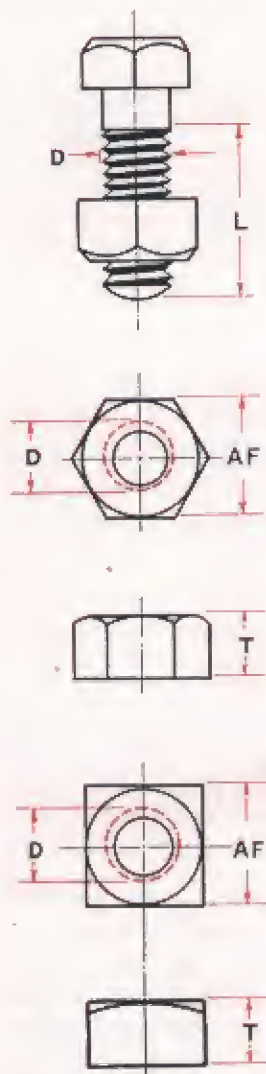
For a given diameter of screw axially loaded, the holding power increases with the length to the limit in hard wood where the metal of the screw fails in tension.

Where holding power is unusually important, select wood screws with thin, sharp threads, rough, unpolished surfaces, full diameter under head and shallow slots.

SOCKET WRENCH SIZES

for Bolts, Nuts, Cap Screws and Lag Screws

To Order Wrenches Use Sizes in Center Column



HEXAGON wrenches will fit:						NOMINAL SIZE ACROSS FLATS	SQUARE wrenches will fit:					
U.S.S.		S.A.E.	American Standard		Mfrs. Std.		U.S.S.		U.S.S. or Am. Std.	American Standard		Mfrs. Std.
Bolts and Nuts	Cap Screws	Bolts and Nuts	Bolts and Nuts ★ 1 2-3	Cap Screws	Bolt Heads		Bolts and Nuts	Cap Screws	Set Screws	Bolts and Nuts	Lag Screws	Bolt Heads
						5/32				0 & 1		
						3/16				2 & 3		
						7/32				4		
						1/4				5 & 6	10	
3/4	3/4					5/16				8		
						11/32				10	3/4	3/4
3/16	3/16	3/4	3/4	3/4	3/4	3/8		5/16	7/16	12 & 3/4		
						7/16						
3/4	5/10	6/10	5/16		5/10	15/32	3/4	3/4	3/4		5/16	5/16
						1/2						
5/16	3/8	3/8	3/8	5/10	3/8	17/32						
	7/16	7/16	7/16	3/4	7/16	9/16	5/16	7/16	9/16	5/10	3/4	3/4
						19/32						
3/8					7/16	5/8		3/8	3/8	3/4	7/16	
						21/32						
7/16	3/8	3/8	3/8	7/10	3/8	11/16	3/8	9/16				7/16
						23/32						
	9/16			3/8	9/16	3/4		3/4	3/4	7/16	3/8	3/8
3/8	3/8	9/16	9/16	9/16	9/16	25/32	7/16					
						13/16				3/8		
9/16	3/4	11/16		3/8	3/4	27/32						9/16
						7/8	3/8	3/4	3/4	9/10	9/16	
3/8	3/8				9/16	29/32						
						15/16				3/4	3/4	3/4
						31/32	9/16					
3/4	1	3/4	3/4	3/4	3/4	1			1			
						1-1/16	3/8					
1 1/4						1-1/8				3/4	3/4	3/4
						1-3/16						
1 1/2						1-1/4	3/4	1	1 1/4			
						1-5/16				3/4	3/4	3/4
1 3/8					3/4	1-3/8		1 1/4				
						1-7/16	3/8					
1 1/2						1-4/2						
						1-9/16			1 1/4	1	1	1
1	1 1/4	1 1/4			1	1-5/8	1					

* Column No. 1 under bolts and nuts covers unfinished and semi-finished bolts.
Column No. 2 covers finished bolts and includes No. 3 which covers unfinished, semi-finished and finished nuts.

In figuring bolt and cap screw sizes the major diameter (D) is the measurement used. The across flats (A.F.) dimension of a bolt or cap screw head is not the size of the fastener but represents the head size which must be considered in selecting a socket. Similarly, the nut size corresponds to the major diameter (D) of the bolt and the across flat (A.F.) dimension is used in selecting the proper socket. There are various manufacturing standards used in making fasteners under this general classification and therefore fasteners with the same diameter (D) dimension will have different head or across flat dimensions. The across flats (A.F.) dimensions and corresponding socket wrench sizes are shown in the center column of the above table. These same socket wrench sizes will be found in the table on the next page.

SOCKET WRENCHES and DRIVING SHANKS

To adapt Black & Decker Power Drivers to the driving of square-head or hexagon-head bolts and nuts, machine screws, cap screws, lag screws and similar fasteners, we can supply a complete range of socket sizes for various size nuts and screw heads as indicated in the table on Page 48. Both hexagon and double-square sockets are available, and the sockets are separable from their drive-shanks; several socket sizes being interchangeable on one shank.

"Drive-openings" in the sockets fit the corresponding "drive-squares" on the ends of the shanks; be sure to match these sizes in ordering separate shanks and sockets.

"Socket size" indicates the size opening in the socket to fit the nut or screw head to be driven.

SOCKETS

Socket Size	Drive Opening	Catalog Number Hexagon Socket	Catalog Number Double Square Socket	Socket Size	Drive Opening	Catalog Number Hexagon Socket	Catalog Number Double Square Socket
1/8"	1/4"	20512	20519	11/16"	1/2"	22776	22777
9/32"	1/4"	20513		3/4"	1/2"	22778	22779
5/16"	1/4"	20514	20520	13/16"	1/2"	22780	22781
11/32"	1/4"	20515	20521	7/8"	1/2"	22782	22783
3/8"	1/4"	20516	20522	15/16"	1/2"	22784	22785
7/16"	1/4"	20517	20546	1"	1/2"	22786	22787
1/2"	1/4"	20518	22915	1-1/16"	5/8"	22788	22789
9/16"	1/4"	22917	22916	1 1/8"	5/8"	22790	22791
5/8"	3/8"	22762	22763	1-3/16"	5/8"	23298	23297
1"	3/8"	22764	22765	1-1/4"	5/8"	23300	23299
5/16"	1/2"	22766	22767	1-5/16"	5/8"	23302	23301
7/16"	1/2"	22768	22769	1-3/8"	5/8"	23304	23303
1 1/8"	1/2"	22770	22771	1-7/16"	5/8"	23306	23305
9/16"	1/2"	22772	22773	1-1/2"	5/8"	23308	23307
5/8"	1/2"	22774	22775	1-5/8"	5/8"	25943	25942



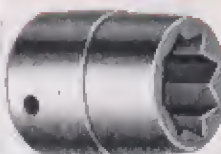
HEXAGON
FOR SMALL SHANKS
DOUBLE SQUARE



SOCKETS



HEXAGON
FOR LARGE SHANKS
DOUBLE SQUARE



SHANKS

Shank sizes are available to fit the various Power Drivers as follows:

1/4" hexagon "shank size"—for Torimeters and Scruguns

7/16" hexagon "shank size"—for Nos. 12 and 22 Power Drivers

5/8" hexagon "shank size"—for Nos. 32, 42 and 43 Power Drivers

"Drive Square Size" on the shank fits the corresponding "drive opening" in the socket; be sure to match these sizes in ordering. Shanks of various lengths are available for normal or "hard-to-reach" applications.

Shank Size	Drive Square Size	Overall Length	Catalog Number
1/4"	1/4"	2"	20510
1/4"	1/4"	6"	20511
7/16"	5/8"	2 3/4"	22792
7/16"	5/8"	5"	22793
7/16"	1/2"	2 3/4"	22794
7/16"	1/2"	5"	22795
5/8"	1/2"	3"	22796
5/8"	1/2"	5"	22797
5/8"	5/8"	3"	22798
5/8"	5/8"	5"	22799

ADAPTORS

When it is desired to use a larger-than-normal socket with a smaller Power Driver, an adaptor can be supplied to fit the larger size socket to the correct shank.

Size Square Male	Size Square Female	Catalog Number
3/4"	1 1/2"	22800
5/8"	1 1/4"	22801
1 1/8"	1 3/8"	22802
1 1/4"	1 1/2"	22803

SHANKS



No. 8 TAPGUN

Automatically-Reversing Tapper

Capacity

The No. 8 TAPGUN is designed for threading holes in steel, cast iron, brass or aluminum. The capacities listed for these various metals are maximum capacities, and are based on the standards and practices as set forth on Pages 52 and 53.

Tapping Capacity: In mild steel 3/16"
 In cast iron 5/16"
 In brass or aluminum 3/8"

Specifications

The structural and operating characteristics of the No. 8 TAPGUN are as follows:

No-load spindle speed: When tapping 400 R.P.M.
 When reversing 525 R.P.M.
 Net weight of complete unit 3 3/4 lbs.
 Shipping weight 5 lbs.
 Overall length (including chuck) 9 1/2"

Standard Equipment—Three-jaw Jacobs geared chuck and key; 3-conductor cable and attachment plug (3rd wire for grounding); two-pole automatic release trigger switch, with switch-locking pin; Universal motor, operates on either A. C. or D. C.

Code Number for standard specifications No. 383

ACCESSORY EQUIPMENT

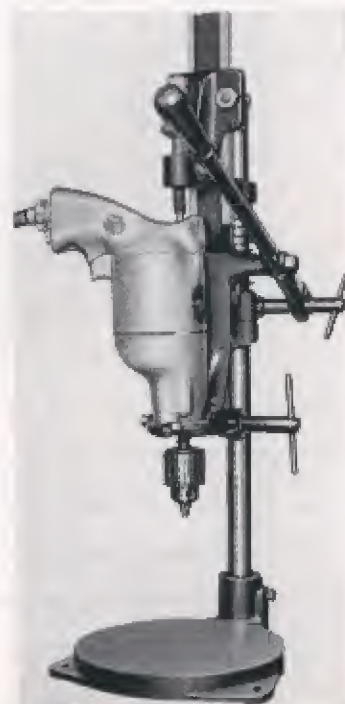
No. 23926 Special Jacobs Tap-Holding Chuck.
 No. 119 Bench Stand for stationary vertical work.

Features

The No. 8 TAPGUN is designed on the same basic features as the No. 8 SCRUGUN and the HORGUN. In fact these three matched units are an ideal "team" for drilling, tapping and driving operations on light-weight metal assemblies. Like the other units, the TAPGUN has the compact, well-balanced, close-coupled construction; the trigger switch convenient for either right- or left-hand use; the minimum spindle offset; full-size screened air vents; splined gear mounting and Universal motor.

Incorporated in the gearing of the TAPGUN is an automatic reversing mechanism, which engages when the operator gives a slight backward pull, and backs the tap out of the threaded hole at high speed. This greatly accelerates the tapping operation and eliminates the need for a reversing switch.

The use of the TAPGUN will speed up tapping operations on large pieces where a portable unit is needed and for installation of accessories on completed units. It is at least eight times faster than hand tapping and its use will greatly reduce tap breakage.



SCALE 1"=1 1/2"

No. 22 TAPPER

Automatically-Reversing Tapper

Capacity

The No. 22 TAPPER is designed for threading holes in steel, cast iron, brass or aluminum. The capacities listed for these various metals are maximum capacities, and are based on the standards and practices as set forth on Pages 52 and 53.

Tapping Capacity: In steel	$\frac{1}{4}$ "
In cast iron	$\frac{3}{8}$ "
In brass or aluminum	$\frac{1}{2}$ "

Specifications

The structural and operating specifications of the No. 22 TAPPER are as follows:

No-load spindle speed: When Tapping.....300 R.P.M.*
When Reversing750 R.P.M.

Net weight of complete unit.....10 $\frac{1}{2}$ lbs.

Shipping weight14 $\frac{1}{2}$ lbs.

Overall length—including chuck15 $\frac{3}{4}$ "

Standard Equipment— $\frac{3}{8}$ " three-jaw Jacobs geared chuck and key; 3-conductor steel-core cable and attachment plug (3rd wire for grounding); two-pole automatic release trigger switch, with switch-locking pin; detachable auxiliary side handle; Universal motor, operates on either A. C. or D. C.

Code Number for standard specifications.....No. 90

*Special Speeds—If other than the standard speed of 300 R.P.M., is required, the No. 22 TAPPER can be supplied, at slight extra cost, for one of the following special tapping speeds; 500 R.P.M., 700 R.P.M. or 1,200 R.P.M.

ACCESSORY EQUIPMENT

No. 20454 Special Jacobs Tap-Holding Chuck

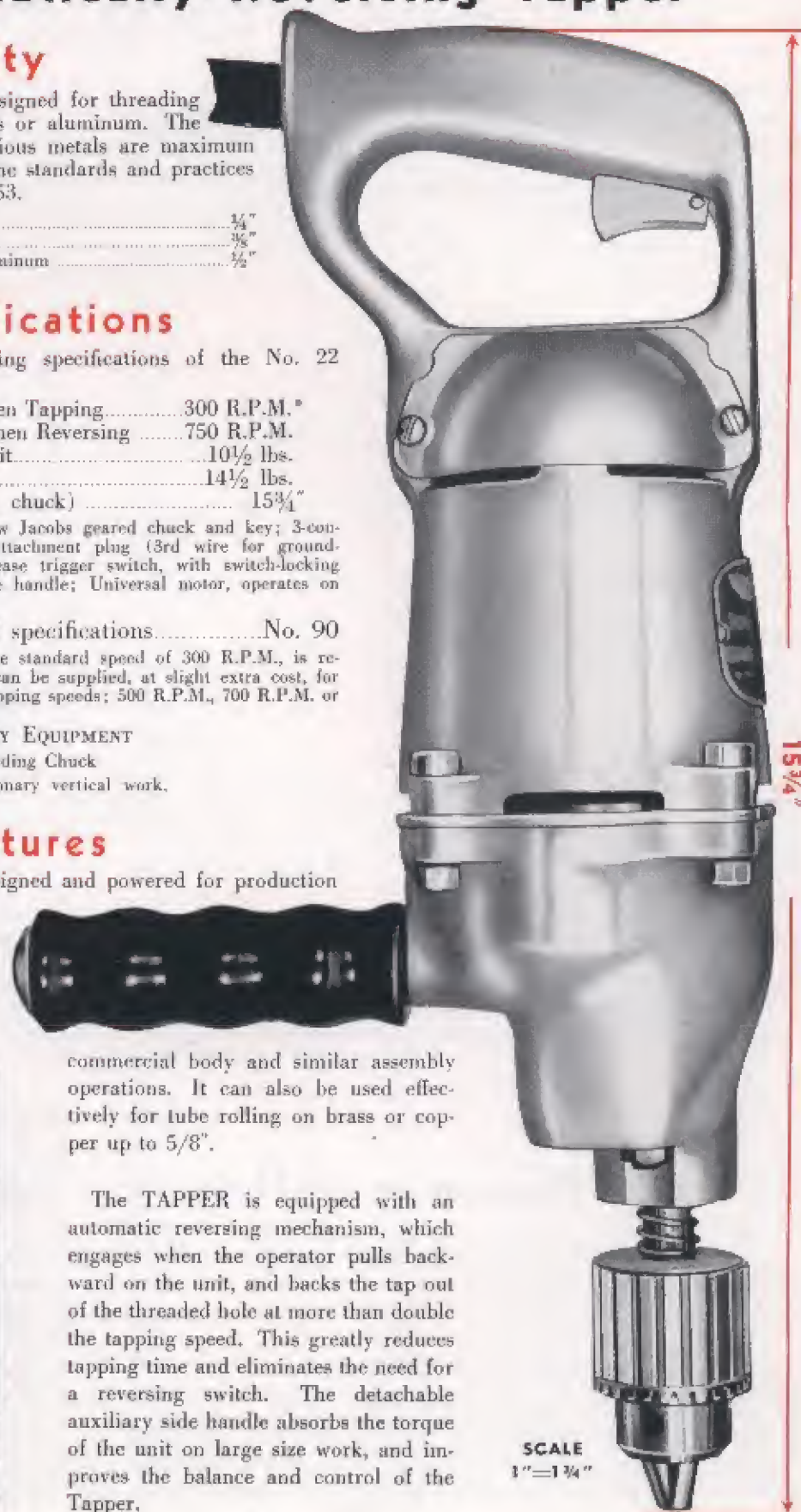
No. 119 Bench Stand for stationary vertical work.

Features

The No. 22 TAPPER is designed and powered for production tapping on pieces too large or heavy to handle on a drill press or tapping machine. It is widely used in metal fabricating, cabinet,

commercial body and similar assembly operations. It can also be used effectively for tube rolling on brass or copper up to 5/8".

The TAPPER is equipped with an automatic reversing mechanism, which engages when the operator pulls backward on the unit, and backs the tap out of the threaded hole at more than double the tapping speed. This greatly reduces tapping time and eliminates the need for a reversing switch. The detachable auxiliary side handle absorbs the torque of the unit on large size work, and improves the balance and control of the Tapper.



TAP THREAD TERMS

BODY. The threaded and fluted part of tap.

CHAMFER. The tapered outside diameter at the front end of the threaded section.

CUTTING FACE. The front part of the threaded section of the land.

EXTERNAL CENTER. The cone-shaped end of the tap.

FLUTE. The groove providing for the cutting faces of the threads or teeth, chip passage and lubrication.

HEEL. The back part of the threaded section of the land.

INTERNAL CENTER. A small drilled and countersunk hole at the end of the tap.

LAND. The threaded web between the flutes.

POINT DIAMETER. The outside diameter at the front end of the chamfered portion.

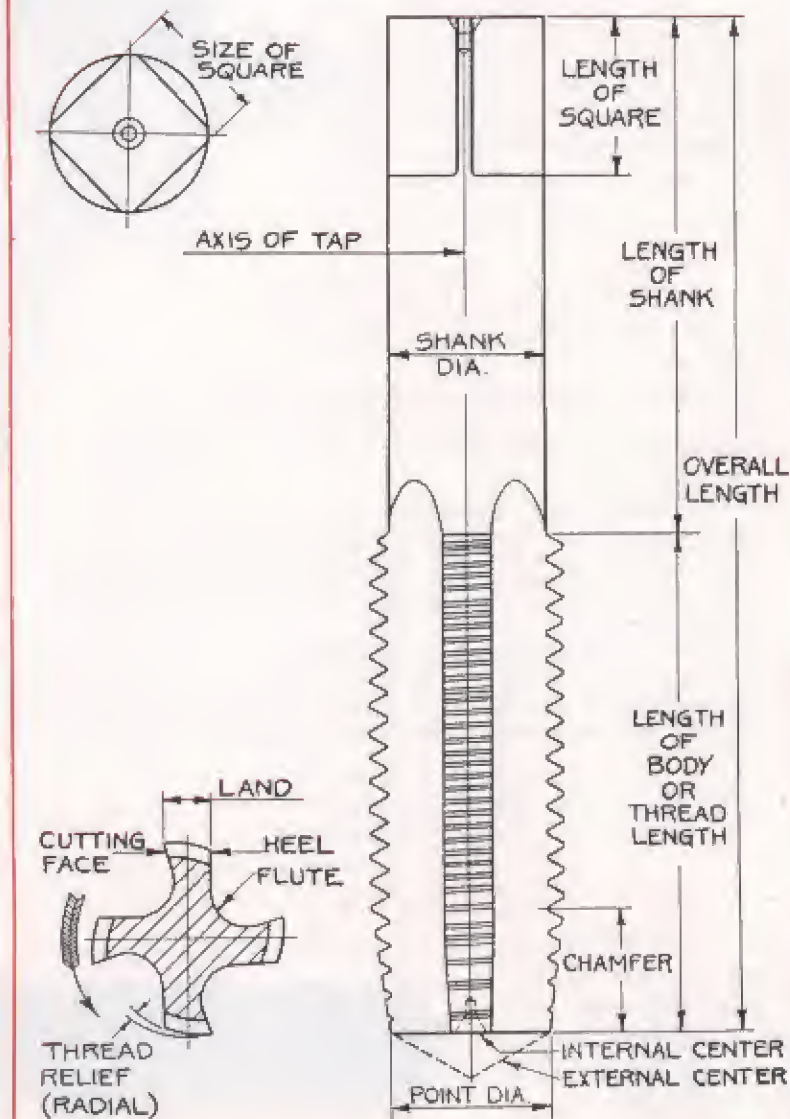
SHANK. The part behind threaded and fluted section of tap.

SQUARE. The squared end of the tap shank.

THREAD. The cutting tooth of the tap which produces the thread in a tapped hole.

THREAD RELIEF (RADIAL). A clearance providing a gradual decline in the major, pitch and minor diameters of the lands, back of the cutting face.

Graphic Illustration of Tap Terms



Preparation of Holes For Tapping

There is a tendency to overlook the importance of properly drilled holes on the subsequent tapping operation. Particularly at production speeds properly drilled holes are of vital importance; the tap is not a corrective for poorly drilled holes. In all cases good clean drilling and a reasonable degree of size maintenance are important.

It is generally understood today that the size of a drilled hole prior to tapping should be large enough to produce a thread depth of approximately 75%. Tables showing the commercial sizes of drills to produce such thread depths (or the nearest equivalent size) are shown on the next page. Lower power consumption and less tapping troubles prompted adoption of the 75% thread depth and it has been proven that in tapping a full 100% thread depth about three times more power is required, producing only about 5% greater strength.

TAP DRILL SIZES

and BASIC THREAD DIMENSIONS

AMERICAN NATIONAL FORM Fractional Sizes			
NOMINAL SIZE	MAJOR DIAMETER INCHES	COMMERCIAL TAP DRILL TO PRODUCE APPROX. 75% FULL THREAD	DECIMAL EQUIVALENT OF TAP DRILL
1/16-64	.0625	3/64	.0469
72	.0625	3/64	.0469
5/64-60	.0781	1/16	.0625
72	.0781	52	.0635
3/32-48	.0938	49	.0730
50	.0938	49	.0730
7/64-48	.1094	43	.0890
1/8-32	.1250	3/32	.0937
40	.1250	38	.1015
9/64-40	.1406	32	.1160
5/32-32	.1563	1/8	.1250
36	.1563	30	.1285
11/64-32	.1719	9/64	.1406
3/16-24	.1875	26	.1470
32	.1875	22	.1570
13/64-24	.2031	20	.1610
7/32-24	.2188	16	.1770
32	.2188	12	.1890
15/64-24	.2344	10	.1935
1/4-20	.2500	7	.2010
24	.2500	4	.2090
27	.2500	3	.2130
28	.2500	3	.2130
32	.2500	7/32	.2188
5/16-18	.3125	F	.2570
20	.3125	17/64	.2656
24	.3125	I	.2720
27	.3125	J	.2770
32	.3125	9/32	.2812
3/8-16	.3750	5/16	.3125
20	.3750	21/64	.3281
24	.3750	Q	.3320
27	.3750	R	.3390
7/16-14	.4375	U	.3680
20	.4375	25/64	.3906
24	.4375	X	.3970
27	.4375	Y	.4040
1/2-12	.5000	27/64	.4219
13	.5000	27/64	.4219
20	.5000	29/64	.4531
24	.5000	29/64	.4531
27	.5000	15/32	.4687
9/16-12	.5625	31/64	.4844
18	.5625	33/64	.5156
27	.5625	17/32	.5312
5/8-11	.6250	17/32	.5312
12	.6250	35/64	.5469
18	.6250	37/64	.5781
27	.6250	19/32	.5937
11/16-11	.6875	19/32	.5937
16	.6875	5/8	.6250
3/4-10	.7500	21/32	.6562
12	.7500	43/64	.6719
16	.7500	11/16	.6875
27	.7500	23/32	.7187

Fractional Sizes (continued)			
NOMINAL SIZE	MAJOR DIAMETER INCHES	COMMERCIAL TAP DRILL TO PRODUCE APPROX. 75% FULL THREAD	DECIMAL EQUIVALENT OF TAP DRILL
13/16-10	.8125	23/32	.7187
7/8-9	.8750	49/64	.7656
12	.8750	51/64	.7969
14	.8750	13/16	.8125
18	.8750	53/64	.8281
27	.8750	27/32	.8437
15/16-9	.9375	53/64	.8281
1	1.0000	3/4	.8750
12	1.0000	59/64	.9219
14	1.0000	15/16	.9375
27	1.0000	31/32	.9687

AMERICAN NATIONAL FORM Machine Screw Sizes			
SCREW GAGE NUMBER	MAJOR DIAMETER INCHES	COMMERCIAL TAP DRILL TO PRODUCE APPROX. 75% FULL THREAD	DECIMAL EQUIVALENT OF TAP DRILL
0-80	.0600	3/64	.0469
1-56	.0730	54	.0550
64	.0730	53	.0595
72	.0730	53	.0595
2-56	.0860	50	.0700
64	.0860	49	.0700
3-48	.0990	46	.0785
56	.0990	45	.0820
4-32	.1120	45	.0820
36	.1120	44	.0860
40	.1120	43	.0890
48	.1120	42	.0935
5-36	.1250	40	.0980
40	.1250	38	.1015
44	.1250	37	.1040
6-32	.1380	35	.1065
36	.1380	34	.1110
40	.1380	33	.1130
7-30	.1510	31	.1200
32	.1510	31	.1200
36	.1510	1/8	.1250
8-30	.1640	30	.1285
32	.1640	29	.1360
36	.1640	29	.1360
40	.1640	28	.1405
9-24	.1770	29	.1360
30	.1770	27	.1440
32	.1770	26	.1470
10-24	.1900	25	.1495
28	.1900	23	.1540
30	.1900	22	.1570
32	.1900	21	.1590
12-24	.2160	16	.1770
28	.2160	14	.1820
32	.2160	13	.1850
14-20	.2420	10	.1935
24	.2420	7	.2010

SUSPENSIONS

for Hanging Power Drivers in Position



Where a Power Driver is to be used constantly in one position, or at a fixed location on an assembly or production line, it is often convenient to suspend the Driver from an overhead support. This cuts down the number of motions in the assembly operation, prevents tangled cables, assists accuracy on delicate work, and tremendously reduces operator fatigue. Suspension is usually accomplished by means of a cable and coil spring on lighter tools; or a balancer adjusted to compensate the Driver's weight on heavier tools. Scruguns and Torsimeters are frequently used with paddle switches when suspended. Listed below are Suspension Attachments for various tools, to adapt them to suspended use.



HORIZONTAL SUSPENSION STRAP

Catalog No. 16205, for No. 32 Power Driver

Catalog No. 16219, for No. 42 Power Driver

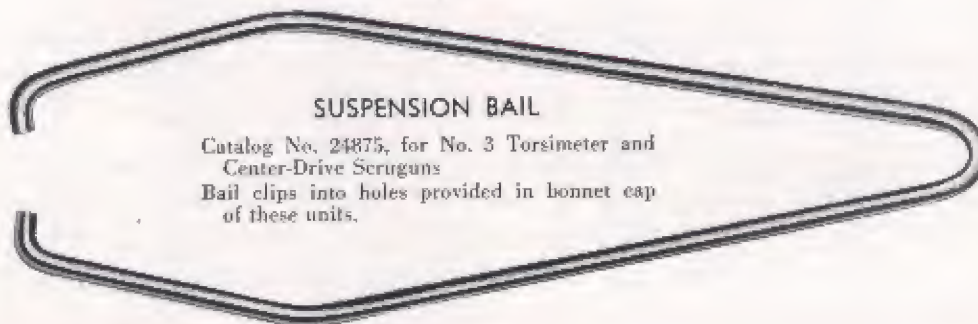
The Strap fits between the field case and side pipe handle adaptor on these units.



VERTICAL SUSPENSION RING

Catalog No. 13244, for Nos. 32 and 42 Drivers

The Ring fastens to the end of the field case, in place of the spade handle on these units.



SUSPENSION BAIL

Catalog No. 24875, for No. 3 Torsimeter and Center-Drive Scruguns

Bail clips into holes provided in bonnet cap of these units.

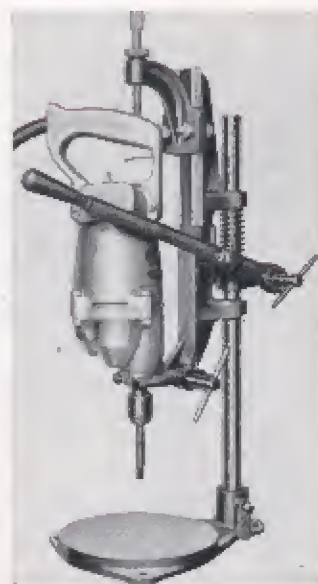
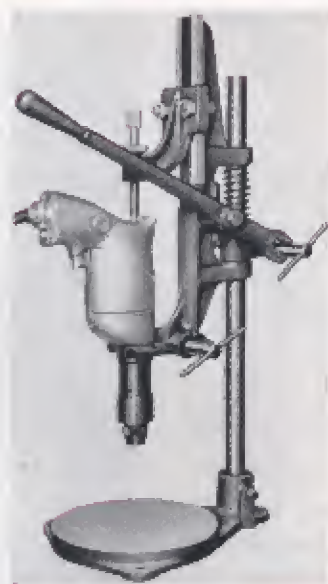
BENCH STANDS

RADIAL and SLIDING ARMS

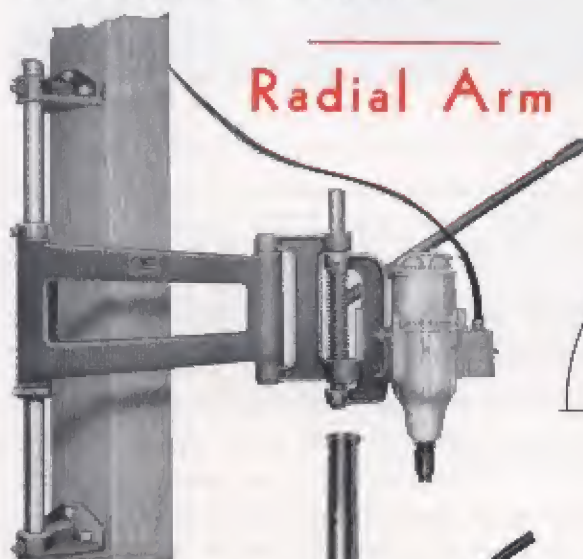
For stationary vertical work the Bench Stand provides many advantages. Carefully machined columns and bracket-ways insure accuracy. Handle leverage permits tremendous pressure on the work, or slow and smooth feed for delicate assemblies. The tool bracket can be raised or lowered on the column and swung in an arc to any position. An adjustable jaw clamp fits spindle housings of various sizes and an adjustment for tool length is quickly made on the tool bracket. The No. 20 Stand will accommodate the No. 8 Scrugun, Nos. 12 and 22 Drivers, No. 3 Tapgun and No. 22 Tapper; is adaptable to either Bench or Post mounting. Maximum feed, 2"; centerline of column to centerline of bit, 5 $\frac{1}{4}$ ".

Code No. 119 Bench Stand, Net weight 16 lbs.

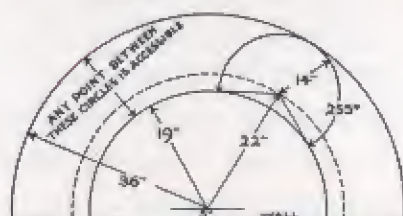
Code No. 120 Post Stand, Net weight 24 lbs.



Radial Arm



Adapted to chain production operations and as indicated in the diagram, can be satisfactorily operated over a wide radius, adjusted vertically on the column and swung to any desired position.



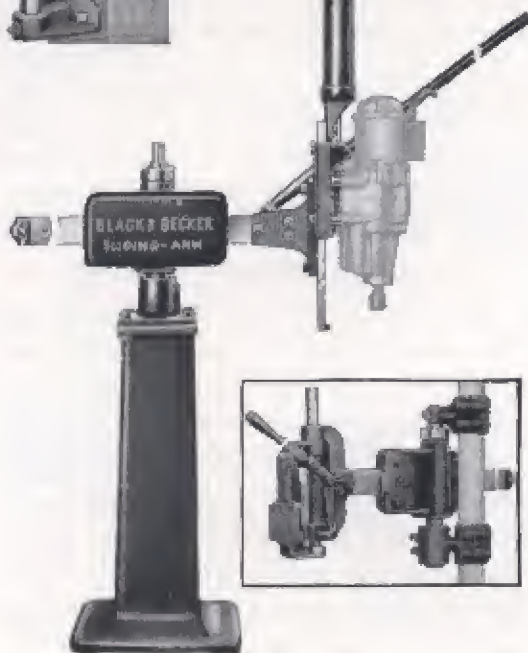
Travel of Arm on column 24"; Vertical travel of bracket 4"; Angular adjustment, tool bracket 255°; Angle of swing 180°. Distance, center of column to elbow 22"; Elbow to spindle of tool 14".

Effective area of operation is within radii from 19" to 36" from column. Net weight 180 lbs. Shipping weight 235 lbs.

Radial Arm complete with one tool adaptor, Code No. 135.

In ordering specify type and size of Electric Tool to be used, so that the proper adaptor will be supplied.

Sliding Arm



The Sliding Arm operates on ball and roller bearings; furnished on pedestal or with a bracket to mount on a post or column. Main illustration shows pedestal mounting with fixed head and large tool adaptor having 8" vertical travel. The inset shows brackets for column mounting and adjustable head for small tools with 4" vertical travel.

Total travel of slide (horizontal) 26 $\frac{1}{2}$ "; Travel of tool in bracket 4"

Radius for operating (minimum) 21 $\frac{1}{2}$ "; (maximum) 49"

Angle of swing (pedestal mounted) 360°; (pipe mounted) 120°

Height adjustment of supporting pedestal column 24"

Net weight (pedestal mounted) 415 lbs.; Shipping weight 490 lbs.

Net weight (pipe mounted) 175 lbs.; Shipping weight 250 lbs.

No. 136 Pedestal mounting, 4" travel, fixed head.

No. 315 Pedestal mounting, 8" travel, fixed head.

No. 137 Pedestal mounting, 4" travel, adjustable head.

No. 138 Pipe mounting, 4" travel, fixed head.

No. 317 Pipe mounting, 8" travel, fixed head.

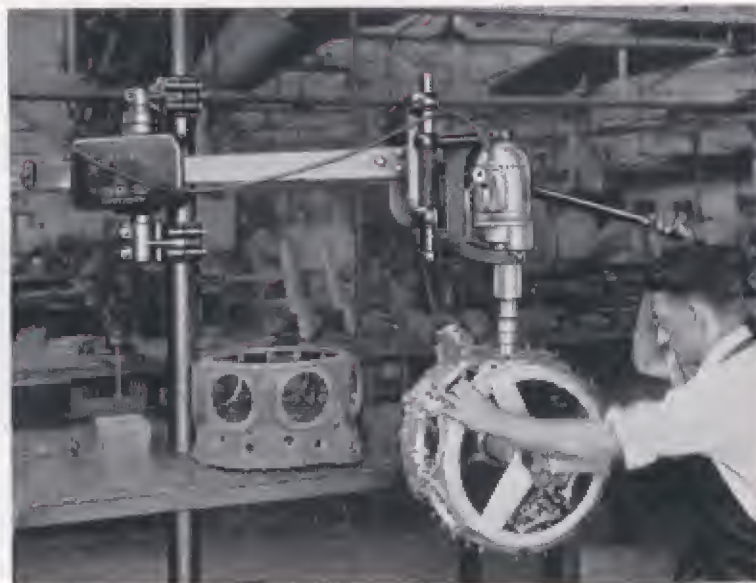
No. 139 Pipe mounting, 4" travel, adjustable head.

In ordering specify type and size of Electric Tool to be used, so that the proper adaptor will be supplied.

STUD SETTING with POWER ASSEMBLY TOOLS

Screw Drivers, Nut Runners and Tappers—as well as Portable Electric Drills—are adaptable to certain types of stud setting operations. The Screw Drivers and Nut Runners are especially fitted to “mass production” operation with the self-opening type of stud holder, as the “dead spindle” feature of these tools simplifies the transfer of the Driver from a driven stud to the next driving position; making it unnecessary to stop the tool after each drive.

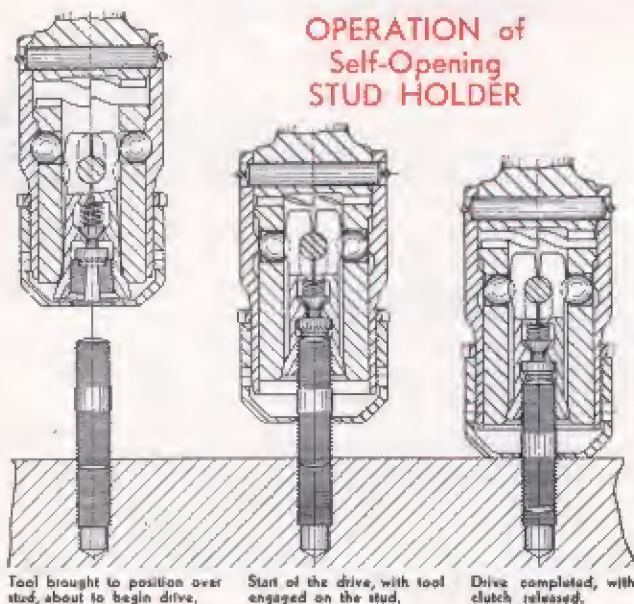
The studs are usually turned in the tapped hole for one or two threads, by hand. The Driver, with the stud holder in place, is located over the stud; as the stud contacts the stud-stop in the holder, the jaws automatically close on the stud and continued downward pressure on the Driver engages the spindle clutch and starts the setting operation.



When the stop collar, which governs the depth of drive, contacts the face of the work the clutch of the stud holder disengages. As the Driver is lifted off the stud, the jaws of the holder open and the Driver clutch disengages; the unit is ready to move on to the next stud and repeat the operation as above.

If the stud is to be set tight to a shoulder or to the bottom of the hole, the Driver clutch will release instantly when the stud is tight, and an upward pull on the unit will release the stud holder jaws.

Tappers, with their automatic reversing mechanism, are used with the solid type of stud holder having a releasing feature through the cam action of the driving pin. With this type of holder, the stud is threaded into the tool until the top of the stud bears against the driving pin thrust washer. As long as driving pressure is maintained, the stud is held tightly in the tool; when driving pressure is released and the reversing mechanism of the Tapper engages, pressure between the stud and the thrust washer is released and the holder backs off the driven stud.



Tool brought to position over stud, about to begin drive.

Start of the drive, with tool engaged on the stud.

Drive completed, with clutch released.

To facilitate all types of stud setting operations, the use of Bench or Pedestal Stands, Radial or Sliding Arms is recommended. These relieve the operator of the high torque of the stud setting operation and simplify the locating of studs on large pieces such as engine blocks, compressor heads, etc.

The stud setting capacities of the various Power Drivers cannot be established accurately here, as the depth of drive, tightness of thread, kind of material, type of stud holding tool and other variables have definite bearing on capacities of the Drivers. Generally, we recommend Drivers with lower spindle speeds and correspondingly higher torque for stud setting. We will be glad to survey your stud setting problems, make tests in your plant and recommend the correct tools.

Proper **USE** and **CARE** of Screw-Driver Bits

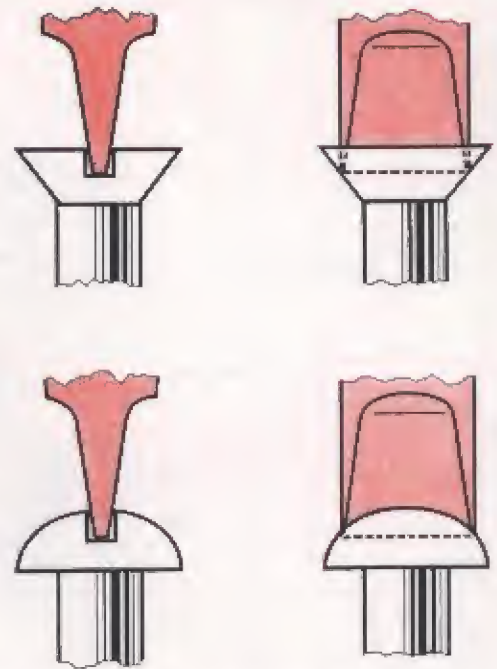
Fitting the Bit to the Screw Head

For all slotted head screws, the Standard Screw Driver Bits as illustrated and listed on Pages 41, 42, and 43 are recommended. The tables on Pages 42 and 43 indicate the correct bits for various sizes and types of slotted head screws.

All Standard Screw Driver Bits have a wedge shaped blade which should fit the screw slot as indicated in the sketches to the right. Note that the bottom face of the bit contacts the bottom of the screw slot; at the same time the sides of the blade contact the sides of the slot at the top edge. Because of variations in manufacturing tolerances, it is not always possible to maintain the theoretically perfect fit between bit and screw slot. It frequently occurs that a bit with maximum tolerance used in a screw slot with minimum tolerance allows clearance at the bottom as the bit is too large to go all the way into the slot. On the other hand a bit with minimum tolerance in a slot with maximum tolerance, permits the bit to bottom without bearing on the side surfaces. These are extreme conditions and will prevent the best Screw Driving operation. To correct the condition, where the bit will not bottom in the slot, grind the side face of the blade until the cross section is reduced sufficiently to permit bottoming. (See "Sharpening Bits" below). If the bit bottoms and does not contact the side surface, select the next larger size bit.

Width of bit is important also. Too narrow a bit does not make full use of the screw head material in absorbing the torsion of the Driver; also there is not sufficient stock in the bit blade for the driving job, and the blade will probably twist or break. Too wide a bit will project beyond the screw head and when the screw is driven home, the projecting edges of the bit will mar the surrounding surfaces.

Before starting an assembly job, check the size bits being used with the screws being driven, according to the above standards.



Sharpening Screw Driver Bits

After long use the blades of Screw Driver Bits become dull and rounded and do not make proper contact in the Screw slot. The surface of the blade also wears smooth and does not hold in the slot as well as a new or sharpened bit. To correct this, the bit can be sharpened on a Bench Grinder Wheel in the following manner:

FIGURE 1. Place the blade against the side face of the wheel (not against the outer edge) with the shoulder of the blade resting against the edge of the wheel.

FIGURE 2. With a finger resting against the outer blade surface, pivot the blade into the side face of the wheel; be sure the entire area of the blade contacts the wheel and hold the bit perfectly flat against the wheel. Then draw the blade toward you and off the wheel. This will grind the entire surface of the blade uniformly and prevent a tapering cut. It will also maintain the correct profile and included angle of the two blade faces. This method of grinding also cuts minute parallel ridges on the blade face which will improve the holding quality of the bit in the screw slot.

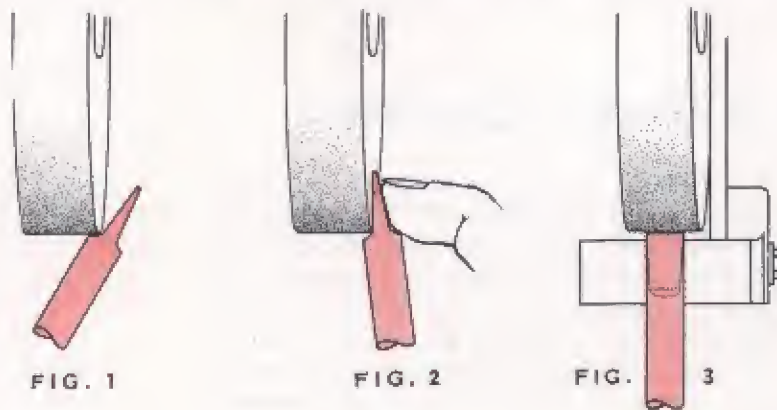


FIGURE 3. Place the bit squarely on the tool rest and grind off the bottom of the bit just enough to restore the original dimensions. This will require very little grinding, and be sure the bit is square with the wheel. If desired, a very flat point with the center about 1/64" higher than the sides, can be ground on the bit. This is especially helpful in driving round head screws.

... SERVICE ...



Any mechanical product will eventually show wear and need service attention. To assure prompt, efficient service on Black & Decker Portable Electric Power Drivers, we operate twenty-five Factory Branch Service Stations. Anywhere on the map you are within overnight mail service to one of the Factory Branches.

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